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FORESTRY ON THE COUNTRY ESTATE

III. FOREST OPERATIONS

By WARREN H. MILLER

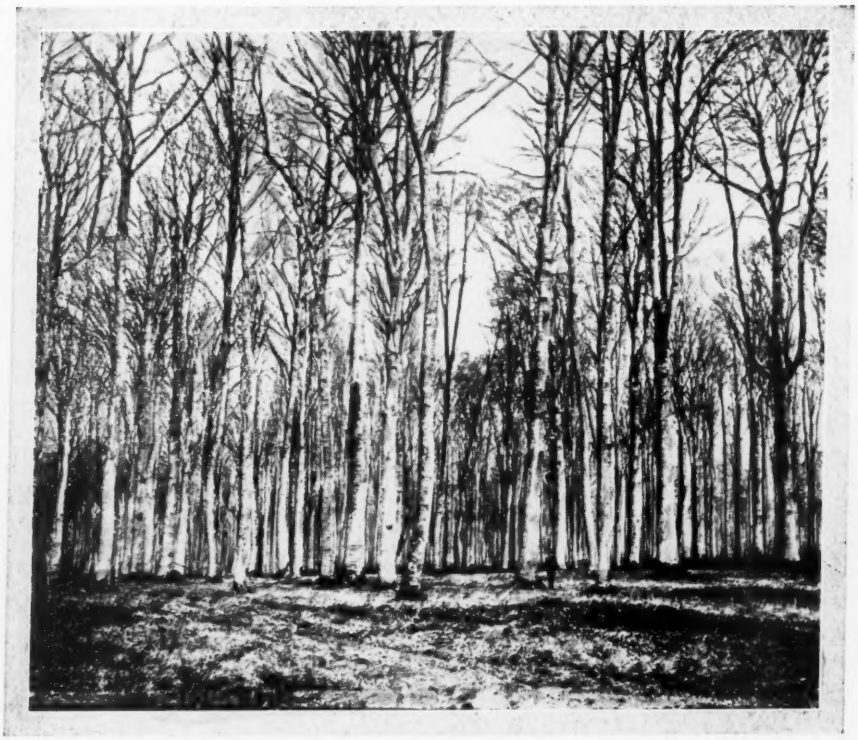
LET us assume that you have in possession a large estate, have inherited therewith considerable woodlot property, and have determined to make a real forest of this, together with certain of your brambly and hilly pasture which figures out best as planted in pine and spruce forest.

It is with the woodland that this article will chiefly deal, for it will be the sphere of your immediate forest activities, whereas the planted pasture had best be left with brush and grasses surrounding the young trees for several years to come, in order to protect them from the bitter winds and frosts of a bleak field in winter and the corresponding droughts in summer.

I am convinced that, for the converted woodlot of either hardwood or evergreen timber, the French system of forestry will appeal to American property owners rather than the characteristic German planted forest. I have studied forestry extensively in both countries and know whereof I speak, wherefore it is with conviction, based on intimate studies of our American conditions in surrounding forests, that I feel that for American private parks and wooded estates the French standard forest treatment will give the most satisfactory results, more particularly on the aesthetic side. For that reason nearly all the illustrations of this article are from representative French practice, in such famous forests as Compiègne, Bellême, Bercy, Eure, Gilley, etc.

If you are going into it purely for commercial ends, by all means raze your fine stands of hardwoods and plant valuable white pines in orderly rows for all the world like an Iowa cornfield—you will come out ahead commercially, in fifty years! But I assume that the estate owner wants to enjoy his forest *now*, is already well on in years, and would like to start in at once to make the wooded part of his place a pleasure to roam in and yet profitable in that it yearly more than pays for its upkeep in cord wood, lumber and forest products. And to this end a combination of the French standard and selective forest systems seems peculiarly adapted.

The French standard forest provides a regular yield per year of mature timber, section by section; and a natural reproduction of each section in pure stands of trees at the end of its revolution, over the whole forest, one section coming mature each year and being self seeded before cutting. In the selection system, trees are taken out here and there when ripe, depending on their neighbors to replace the tree by natural seeding. The standard system gives the better yield at the least cost, and if there are eighty sections in the forest one ripe section is cut every year besides seeding cuts and secondary cuts on the adjacent sections. There is also a regular series of thinnings to attend to on various sections, so that the life work of a standard French forest is a very active and profitable one. The system applies directly to our own woodlands, because we already have a stand of mature timber, some of it too old, some in the sapling state, but the majority of it strong, vigorous trees of ten to fourteen inch diameter, with a dense second growth of saplings underneath. Our



A Pure Stand of Beech.
BEECH IS OFTEN USED TO REGENERATE THE SOIL AFTER SEVERAL REVOLUTIONS OF OAK. FOREST OF EURE, FRANCE.

forests are, however, a terrible mixture, hardly any two adjoining trees being alike, though one or two tree species, such as oaks and maples, usually predominate.

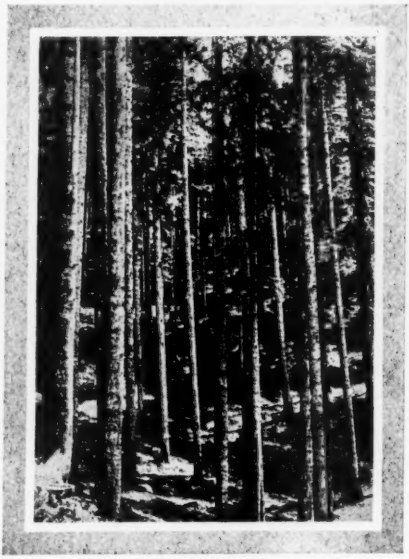
Now, every section on a French forest is of trees all of the same species and all of the same age, though each section differs from the next in the age of the trees on it; yet none of it is planted nor ever will be, for, by an ingenious system of cutting, the complete regeneration of the section in the same species and in pure stand is obtained before all the old trees are cut off. Instead of taking off all the trees on a section at one cutting, a seeding cut is first made, that is, enough trees are taken to let in the sunlight on the forest floor. Now, every two or three years the forest has a heavy seed year throughout its life, but usually these seeds do not germinate for lack of sun. A few do, as in a natural forest, for that is Nature's way of keeping up the species—thousands of seeds in order that one tree may survive to take the place of the parent tree. But, with the seeding cut, in comes the sun, and a large proportion of the seeds germinate and soon the forest floor is covered with a thick growth of young seedlings. These need at first shade, not because the young tree wants it but because the humid soil would soon dry out if only these little seedlings protected it from the sun. Three years later the young seedlings need more sun, and a secondary cut is made, letting in a very large amount of sunlight, in fact the remaining old trees do little but shade the young saplings and fill in any bare spots with their own seed. At the tenth year from the seeding cut the terminal cut is made, and all the old

WELL KEPT FOREST ROADS AND TRAILS.

THIS SHOWS A PURE OAK STAND IN THE FOREST OF COMPIEGNE, FRANCE. NOTE THE EXCELLENT CONDITION OF THE ROAD, WHICH IS TYPICAL OF GOOD FOREST MANAGEMENT.

trees are then marketed, leaving a new stand of young ten-year saplings on the section. In this way the reproduction has cost nothing; but, though this system was originally proposed and adopted in Germany, it did not become popular there, for it does not pay as well as the planted forest, because the trees are not as straight as if planted in rows, several years are lost in getting the reproduction, and the crop is harvested in three cuts instead of one. Today in Germany you will see but few of these forests except along the upper Rhine, but the system is very popular in France. It is destined to be used in American forest estates very extensively, being a change on the lines of least resistance, and will be made along with the planted evergreen forests on old waste land. Our problem, then, is how to change our rough-and-tumble woodlot into a standard forest, for by doing so you combine beauty and utility, keeping all the pleasurable aesthetic features, yet at the same time making something valuable out of what is at present but a mess of cord wood.

The first step is an inspection of your domain, with a view to ascertaining what are the dominant trees and their ages in the various parts of your forest property. In Chapter One of this series we looked over the property with an eye to preserving and accentuating its aesthetic beauties; now let us see what can be done towards organizing the forest into something of utility. Nature has already been trying to do something along the lines of the French standard forest, for her dominant species in each locality, that is, the trees that thrive best in your different conditions of soil moisture and exposure, have usurped most of the growing room, and the other species are struggling for a foothold. Some of these will be undesirable from a forester's standpoint and will have to be discouraged, others are just what you want and only need a little help and encouragement to form a section in themselves. The size of the section does not matter, within reasonable limits, that is, not too small to make a commercially profitable cutting; it is the age with which you are principally concerned. It is important to introduce a series of sections of as even ages as possible, and here also nature has been at work, for many localities will have a dominant age, that is, the major part of the trees will be approximately of an age. Here, for example, is a grove of maples, a regular sugar bush of them. Taking the places where they are thickest and other places where they still predominate there must be several acres of them. Further



How a Forest Floor Should Look.

SAPLINGS AND BRUSH CLEANED OUT AND TREES PROPERLY THINNED. FOREST OF GILLEY, FRANCE.

inspection shows that a little judicious thinning of undesirables will make that stand almost pure maple. Now, of course, one is not to run amuck with the axe here and take out everything that is *not* a sacred maple, there may be a fine white oak or several of them, and maybe one or two scenic trees which should be left in for their aesthetic value, but quite a few nondescript trees can come out to give the young maples under them a chance to come ahead. Such a "bush" usually wants thinning also, for young maples endure a lot of shade and are prone to get a good deal

TOO MUCH OF A SEEDING CUT

TH S SECT ON WILL HAVE TO BE PLANTED. THE SEED TREES WERE LEFT TOO UNPROTECTED AGAINST BEING WIND-THROWN, TOO YOUNG AND TOO FAR APART. VOSGES, FRANCE.

too thick. Again, certain sections will have so many young maples in the underbrush that you had best take off the large mixed-species trees overhead, thus acquiring a young section of maples at nearly an age.

Here, in this high flat table-land, the white oaks have made a great showing. Cruising through your forest thereabouts you note that there appears to be either a small one or some big sturdy specimen about every few rods, in all there are enough of them to warrant making a section of white oak. First, we will take out everything that is palpably interfering with the growth of the white oaks already in the stand, after which we will look around to see what chance there is for a seeding cut in the neighborhood of the large seed-bearing white oaks which are scattered here and there in the section. Clearing away the general underbrush is a first step towards a good seeding cut, and the next consists in taking out undesirables that are at present keeping the sunlight off the forest floor. This must be done judiciously, not too much or you will have a husky epidemic of weeds, but with enough out to give sunlight from 10 a. m. to 4 p. m. you will find a thick fur of young oaks on that floor inside of two years. If this has been done pretty evenly all over the section you will wake up to the fact some day that here is a forest of young oaks, all of an age, growing up under the larger trees, which young oaks will demand more and more sunlight as they grow older, requiring more and more of the older trees to be taken out, and before you know it that section will be on the standard forest (*futaie regulaire*) system.

A little further on we come to a big ravine of rich soil that is doing well in a natural forest of white pines, started by a few that the lumberman overlooked. For some reason of cross-pollenization, isolated specimens of white pine seldom set fertile seeds, and grow old and die without any colony of young ones coming up around them. But a clump of even a few of them pro-

ceed to fight for the ground that they originally owned in entirety, and they push their young ones out on all sides. Young white pines seem to thrive under any quantity of shade (I have one that has reached its thirty-fifth year growing within two feet of a huge chestnut oak which never gives it a scrap of sunlight), so that once a ravine full of them gets a foothold this forest is bound to spread and grow. Here is a good place to plan to fill up gaps with what is known as underplanting. Do not do this at regular spacings and intervals but select, rather, favorable locations where the young trees get good soil and lots of sunlight, without any unnecessarily expensive work with the axe in clearing away overhead thickets. The best tree for underplanting is the state or forestry company's nursery four-year transplant, and it is best planted on the mound system, *i.e.*, with a shallow hole in the soil, the roots spread in a little cone of rich top-soil and finally the basic mineral soil and forest leaves banked around the tree covering the root collet. The root soil should be firmly packed with the feet and the mound soil tamped with the back of the spade. With the help of some underplanting and judicious assistance to every young specimen of natural white pine found on the area you will soon have in process of formation a natural white pine section which will vie with your planted sections out in the brambly pasture.

I have always a penchant for the nut-bearing forest trees with which nature has so generously endowed us. Not all nor by any means the most valuable products of a forest are its lumber tallies. Maple sugar, hickory nuts, seeds and acorns at the prevailing market prices for seeds for nursery use, and tanning bark all pay well, much better per acre of ground than lumber, and none of them should be neglected on the small forest of the country estate. Where you will find one shagbark hickory there will be several of them, as they are prone to form groves. If there is such a grove on your land, or even the nucleus of one, by all means encourage it, both by planting nursery saplings, costing about 75 cents for young two-inch trees, and by transplants from your own little forest nursery, which matter will be gone into later. I do not believe that any satisfactory results will be got from seeds

A Specimen Oak.

THE LAST OF THE OLD STAND. 52 FEET TO THE FORK. 120 FEET HIGH. 21 FEET IN CIRCUMFERENCE AT BASE. THE NEW FOREST OF SAPLINGS HAS ALREADY REACHED 30 FEET IN HEIGHT. FOREST OF BELLEME, FRANCE.

planted at random in the forest, for the chances of success are so slim that nature herself has to use a whole treeful of seeds or nuts every few years in order to get one new tree to maturity. But when properly grown in your own nurs-

ery and transplanted, or else transplanted from a commercial nursery in which root-pruning has been well attended to, the young tree is almost sure to succeed. These young saplings should go on not less than fifty-foot centers, for the capacity to produc· nuts is directly dependent upon sunlight and general unhampered vigo . Needless to say all hindering trees are to be taken out.

After a look-over of the property we have in mind a rough plan of the make-up of the future forest, and can then lay out one of the most important items in it, the roads and trails. These should in general follow the boundaries of the various sections or rather the boundaries should be made by the roads, which are in turn determined by plane-table measurements and their utility in serving the various sections. You have lumber, cordwood, and forest products to take out (for none of them should be stored in the forest itself, since to do so is to invite an insect epidemic); there are saplings, seedlings, soil and spray-wagons to take into the forest, so practicable roads and trails that are reasonably negotiable to narrow-gauge wagons (such as the portable spray-pump) must be provided. Our photograph of the trail and road-crossing in the forest of Compiègne will give some idea of the pride the French take in such work. Eight feet width will answer for a forest road and the principal labors in connection with building it are taking out the trees in the way, stumping with dynamite, and grading through the duff to mineral soil. In general the trails will bound or lead through the small sections, and the main road will serve the larger ones directly, and the others indirectly by way of the trails. And, until such a road is built, you have no forest but just a brush patch, out of which nothing can be taken except in winter when the snow makes it possible for sleds to operate. These are all right and necessary for transient lumber operations, but for a permanent forest that is to be an active part of a country estate, a good system of roads and trails should be put in, as much as on any other part of the farm. Of course the bulk of the lumber work will be done in winter, as there is no better solutic·n of the winter labor problem on a big farm than to employ the men in active forest operations during the slack times of December and January; but there is a good deal of summer work to do also, such as planting, spraying and sugaring-off in the spring, and getting out nuts and cord wood from thinnings in the fall, so that good roads are by no means an expensive luxury; in fact, with-

A Seeding Cut in a Pure Oak Forest.
NOTE THE SPACING OF THE SEED TREES REMAINING.
FOREST OF BERCY, FRANCE.

out them the forest degenerates into the inactive woodlot, where most of the products are let go to rot because it is too expensive to take them out to make it worth while.

I have spoken of the clearing out of underbrush incidental to a seeding cut. While, in certain French forests, the underbrush is allowed to remain for the sake of the leaf fall that it contributes to the general forest humus, I never could see any real gain in so doing. No one would think of running an orchard with all the ground space filled up with little trees and bushes, and

THE ADVANTAGES OF A GOOD ROAD.
SMALL FORCE GETTING OUT CORDWOOD IN SEPTEMBER IN THE FOREST OF GILLEY, FRANCE.

why do so in the forest where the growth of the big trees is the main point? A tree must have food for its roots and sunlight for its leaves; not one of them, but both. It cannot thrive if every foot of the forest soil is covered with saplings which contest for food with the big trees. The roots of the latter lie as close to the surface as the roots of the sapling. They all must abide where there is the warmth of the sun and air and the microbial growth in the humus to feed the roots. It is a fallacy to suppose that many of the main roots of a tree go far down into the mineral soil in search of food. There are several tap and anchor roots which go down deep for the purpose of withstanding the overturning effect of gales, but the big feeder roots spread right out about two feet or less below the surface, as anyone who has stumped many trees knows. Here they have a network of sapling roots to contend with, and if these latter are taken out, not only is the forest a much more open and pleasant place to walk about in but the big trees have much more room to put out new roots without robbing each other. You do not need saplings until the end of the revolution, when you can get them quickly enough by a seeding cut. To clear out saplings and brush is something more of a problem than it looks, for a careless mattockman is likely to cut off many an important root of a big tree in his efforts to clean up the forest floor. In my own forest a mattock man will grub and clear about 3,500 square feet of forest floor per day, and I found that the best way to insure my big roots not being cut was to take his axe away from him and let him use the mattock hoe alone. This tool has a broad blunt adze edge on one face, and a thin axe blade on the other. The latter is good enough to cut small roots and aid in uprooting bushes, but will glance off a large root. For clearing saplings the best procedure is to cut them out close to the root-collet and then grub up all those that sprout again the following year.

I know of two adjoining woodlots in the western part of my State, one of which has had the saplings cleared out and the other is still a dense tangle of underbrush; and there is no comparison in the vigor and value of the trees on the two lots. The one is almost all pure natural white oak, got by judicious thinning out of undesirables which

were formerly crowding these young oaks; the other is a big mixture, with about nineteen white oaks to the cruising mile, most of them choked and deformed by pin oaks and red oaks with their faster growth and bigger leaf area. The first woodlot is worth about twice as much as the second, just as it stands. It is really wonderful how quickly a tree will push out and fill all the available space you clear for it in a forest, for the natural crowding and competition is fearful and every tree is ready and equipped to take advantage of the least accident to its neighbors to get ahead and do some big growing. It is the crowding that keeps all our forest trees about of a single height and diameter; most of them could do better if the others would give them a chance. This is the work that you must do with the axe to push along your desirable trees, and you will be surprised at the sudden increase in height and trunk diameter that follows a judicious thinning.

In our next chapter will be presented some details on private nurseries for special deciduous trees, and the best methods of combating the attacks of fire, fungus and insect enemies, as practiced in the forest of a large country estate.

(*To be continued.*)

AMERICAN FORESTRY ASSOCIATION EXHIBITS

THE American Forestry Association will have attractive exhibits of the work it is doing at the Forest Products Exposition, to be held in the Coliseum, Chicago, April 30th to May 9th and in the Grand Central Palace, New York, May 21st to May 30th.

Gradually the Forest Products Exposition is shaping itself definitely. Various associations are making more or less elaborate plans; large and small concerns are preparing for active demonstration of the value and merits of their wares and their specialties; the Forest Service of the U. S. Department of Agriculture is assembling a demonstrating exhibit that will probably be the most enlightening and interesting display of the sort ever given; the woodworking machinery people are polishing up the machines that in their operations will show the last degree of efficiency and mechanical advancement, and there is every reason to justify those in touch with the actual preliminary details in predicting one of the most representative, attractive and generally important industrial expositions ever given in this country. Special arrangements have been completed for the speedy yet unhurried transfer of the Chicago exhibits to New York; both expositions will be installed and handled by the same force of men; the moving picture exhibit in connection with both expositions will contain wonderfully accurate views of activities in every branch of the wood industry, a large attendance of manufacturers, producers, specialists, engineers, architects, contractors, builders, buying and selling forces, educationalists, the mechanical forces of the factory, the mill and the shop, organizations and individuals representing every branch of the industry and the great power, the home builder, street improvement voter, investor in improvements in building, the layman, the ultimate consumer, will go to Chicago and to New York to study the actualities and see the proofs and observe the multitude of things they never dreamed of, according to every indication.

In trying to find uses for blight-killed chestnut it has been found that it can not be utilized for crating stone; quarry owners say that chestnut wood leaves an indelible stain on the marble or granite.

Railroads caused nearly half the forest fires in Colorado and Wyoming last year, and almost one-sixth were set by lightning. In California lightning started more than half, with railroads a comparatively insignificant cause.

A WOMAN AS A FOREST FIRE LOOKOUT

ALL alone, 6,144 feet above sea level, on top of Klamath Peak in Siskiyou County, California, a young woman for months at a time during the prevalence of the forest fire season, did her part, and did it well, in the effort the Government is making to preserve the forests of the country from the destructive flames which have for years past caused an average annual property loss of twenty-five million dollars, and cost annually an average of seventy-five human lives.

She is Miss Hallie M. Daggett, and she is the only woman lookout employed by the Forest Service. Posted in her small cabin on top of the mountain peak it was her duty to scan the vast forest in every direction as far as she could see by naked eye and telescope by day for smoke, and for the red glare of fire by night, and report the result of her observations by telephone to the main office of the forest patrol miles and miles away.

Few women would care for such a job, fewer still would seek it, and still less would be able to stand the strain of the infinite loneliness, or the roar of the violent storms which sweep the peak, or the menace of the wild beasts which roam the heavily wooded ridges. Miss Daggett, however, not only eagerly longed for the station but secured it after considerabl exertion and now she declares that she enjoyed the life and was intensely interested in the work she had to do.

Perhaps the call of the wild is in her blood. Her parents are pioneers, her father, John Daggett, having crossed the Isthmus in 1852 and her mother, a mere baby, being taken across the plains from Kentucky the same year. Miss Daggett was born at the Klamath mine, in the shadow of the peak on which the lookout station is perched. She spent most of her early years out of doors riding and tramping over the hills with her brother, so that it was natural that with her inborn love of the forests she should be anxious to take part in the fight which the Forest Service men are making for the protection of the forests. Debarred by her sex, however, from the kind of work which most of the Service men are doing she saw no opportunity until lookout stations were established, and then after earnest solicitation secured the place she held so well.

Some of the Service men predicted that after a few days of life on the peak she would telephone that she was frightened by the loneliness and the

MISS HALLIE M. DAGGETT, THE YOUNG WOMAN WHO DID EFFICIENT WORK FOR THE FOREST SERVICE AS A FOREST FIRE LOOKOUT ON KLAMATH PEAK, CALIFORNIA.

danger, but she was full of pluck and high spirit, and day after day as her keen eyes ranged the hills which constitute the Salmon River watershed and as she mad her daily reports by telephone she grew more and more in love with the work. Even when the telephone wires were broken and when for a long time she was cut off from communication with the world below she did not lose heart. She not only filled the place with all the skill which a trained man could have shown but she

IT WAS ON THE VERY TOP OF KLAMATH PEAK THAT MISS DAGGETT WAS STATIONED.
CLUSTERED NEAR THE FOOT ARE THE HOUSES AT KLAMATH MINE, WHERE MISS DAGGETT WAS BORN. MILES UPON MILES OF FORESTED HILLS CAN BE SEEN FROM KLAMATH PEAK.

EDDY'S GULCH LOOKOUT STATION ON TOP OF KLAMATH PEAK WHERE MISS DAGGETT WAS STATIONED FROM JUNE 1 TO NOVEMBER 6 LAST YEAR.
THE ELEVATION IS 6,444 FEET.

desires to be reappointed when the fire season opens this year.

The story of her experiences she has told for AMERICAN FORESTRY and here it is:

"My earliest recollections abound with smoke-clouded summer days and fires that wandered over the country at their own sweet will, unchecked unless they happened to interfere seriously with someone's claim or woodpile, when they were usually turned off by back firing and headed in another direction, to continue their mischief till they either died for lack of fuel or were quenched by the fall rains. Such being the case, it is easy to see that I grew up with a fierce hatred of the devastating fires, and welcomed the force which arrived to combat them. But not until the lookout stations were installed did there come an opportunity to join what had up till then been a man's fight; although my sister and I had frequently been able to help on the small things, such as extinguishing spreading camp fires or carrying supplies to the firing line.

"Then, thanks to the liberal mindedness and courtesy of the officials in charge of our district, I was given the position of lookout at the Eddy's Gulch Station in the fourth District of the Klamath National Forest; and entered upon my work the first day of June, 1913, with a firm determination to make good, for I knew that the appointment of a woman was rather in the nature of an experiment, and naturally felt that there was a great deal due the men who had been willing to give me the chance.

"It was quite a swift change in three days, from San Francisco, civilization and sea level, to a solitary cabin on a still more solitary mountain, 6,444 feet elevation and three hours' hard climb from everywhere, but in spite of the fact that almost the very first question asked by everyone was 'Isn't it awfully lonesome up there?' I never felt a moment's longing to retrace the step, that is, not after the first half hour following my sister's departure with the pack animals, when I had a chance to look around. Of course I had been

ON MANY A DAY MISS DAGGETT VIEWED THIS SCENE, THE PEAK BEING ABOVE THE CLOUDS.
THE VIEW IS TOWARDS THE SOUTH WHERE LIES TRINITY COUNTY. PACKERS PEAK IS AT THE EXTREME LEFT.

on the peak before during my early rambles, but had never thought of it as a possible home. One of my pet dreams had always been of a log cabin, and here was an ideal one, brand new the summer before, and indoors as cozy as could be wished; while outdoors, all outdoors, was a grander dooryard than any estate in the land could boast; and, oh, what a prospect of glorious freedom from four walls and a time clock!

Klamath Peak is not really a peak in the conventional sens of the word, but as can be seen from the picture, is rather the culmination of a long series of ridges running up from the watersheds of the north and south forks of the Salmon River. Its central location in the district makes it, however, an ideal spot for a station. I can think of no better description of it than the hub of a wheel with the lines of ridges as spokes, and an unbroken rim of peaks circling around it; some eternally snow capped, and most all of them higher than itself.

"To the east, a shoulder of snowy Shasta and an unseen neighbor lookout on Eagle Peak; further to the south, the high jagged edge of Trinity County and, just discernible with the glasses, a shining new cabin on Packers Peak; in the west, behind Orleans Mountain with its ever watchful occupant, a faint glimpse of the shining Pacific showing with a favorable sunset; and all in between, a seeming wilderness of ridges and gulches, making up what is said to be one of the finest continuous views in this western country.

"However that may be, it was certainly a never-ending pleasure to search its vast acres for new beauties at every changing hour, from sunrise to sunrise again.

"Added to the view was a constantly spreading, gaily tinted carpet of flowers to the very edges of the snow banks. These all summer and then the gorgeous autumn coloring on the hillsides later on, when the whole country seemed one vast Persian rug.

"Bird and animal life was also very plentiful, filling the air with songs and chatter; coming to the doorstep for food, and often invading the cabin itself. I positively declined owning a cat on account of its destructive intentions on small life,—a pair of owls proving satisfactory as mouse catchers, and being amusing neighbors as well. Several deer often fed around evenings; there was a small bear down near the spring, besides several larger ones whose tracks I often saw on the trail; and a couple of porcupines also helped to keep from being lonesome, by using various means to find a way into the cabin at night.

"All these animals being harmless, it had never been my custom to carry a gun in so-called western fashion, until

THE ARRIVAL OF THE VERY NECESSARY WATER SUPPLY, SHOWING THE METHOD BY WHICH SUPPLIES WERE TAKEN TO THE TOP OF THE MOUNTAIN WHERE MISS DAGGETT WAS STATIONED.

one morning I discovered a big panther track out on the trail, and then in deference to my family's united request, I buckled on the orthodox weapon, which had been accumulating dust on the cabin shelf, and proceeded to be picturesque, but to no avail, as the beast did not again return.

"At many of the stations the question of wood and water is a serious one on account of the elevation; but I was especially favored, as wood lies about in all shapes and quantities, only wait-

HERE IS A JANUARY SCENE FROM THE LOWER RIDGES OF KLAMATH PEAK.

ing for an ax to convert it into suitable lengths; and water unlimited could be melted from the snow banks which lingered until the last of July, although it did seem a little odd to go for water with a shovel in addition to a bucket. Later the supply was packed in canvas sacks from a spring about a mile away in the timber. This was always a job sought for by anyone coming up on horseback; and thanks to the kindly efforts of the guards who passed that way, and my few visitors, it was always easy to keep the kettle boiling. So I did not need a horse myself, there being, contrary to the general impression, no patrol work in connection with lookout duties, and my sister bringing up my supplies and mail from home every week, a distance of nine miles.

"The daily duties of life on top were small, merely consisting of an early morning and late evening tramp of half a mile to the point of the ridge where the trees obscured the north view from the cabin; and a constant watch on all sides for a trace of smoke, a watch which soon became a sort of instinct, often awaking one in the night for a look around; for I soon came to feel that the lookout was, what one friend so aptly called it, 'an ounce of prevention.' Then there were the three daily reports to the district headquarters in town, to prove that everything was serene, also the extra reports if they were not; and a little, very little, housework to do.

"Taking it all in all, not a very busy day, as judged by modern standards of rush, but a lookout's motto might well be 'They also serve who only stand and wait,' and there was always the great map spread out at one's feet to study by new lights and shadows while waiting, and the ever busy phone with its numerous calls, which must be kept within hearing, so one could not wander far.

"That phone, with its gradually extending feelers through the district, made me feel exactly like a big spider in the center of a web, with the fires for flies; and those fires were certainly treated to exactly the speedy fate of the other unworthy pests. Through all the days up to the close of the term on November 6th, when a light fall of snow put an end to all danger of fires, there was an ever growing sense of responsibility which finally came to be almost a feeling of proprietorship, resulting in the desire to punish anyone careless enough to set fires in my dooryard.

A Tree Near Miss Daggett's Cabin Which Was Struck by Llightning.

It was the same stroke of lightning which caused the lightning arresters to burn out and cut Miss Daggett from telephone communication with the main fire patrol station.

"The utter dependence on the telephone was brought vividly to my mind one afternoon, soon after my arrival, when an extra heavy electrical storm which broke close by caused one of the lightning arresters on the outside of the cabin to burn out, quite contrary to precedent, and I was cut off from the world till the next day, when someone from the office came up in haste to find out the cause of the silence and set things aright. They often joke now about expecting to have found me hidden under some log for safety, but it wasn't quite so funny then.

"However, there seems to be very little actual danger from these storms,

MISS DAGGETT ON HER PET HORSE AT THE HIGHEST POINT OF KLAMATH PEAK, LOOKING NORTH.

in spite of the fact that they are very heavy and numerous at that elevation. One soon becomes accustomed to the racket. But in the damage they cause starting fires lies their chief interest to the lookout, for it requires a quick eye to detect, in among the rags of fog which arise in their wake, the small puff of smoke which tells of some tree struck in a burnable spot. Generally it shows at once, but in one instance there was a lapse of nearly two weeks before the fall of the smouldering top fanned up enough smoke to be seen.

"At night the new fires show up like tiny candle flames, and are easily spotted against the dark background of the ridges, but are not so easy to exactly locate for an immediate report. Upon the speed and accuracy of this report, however, the efficiency of the Service depends, as was proven by the summer's record of extra small acreage burned in spite of over forty fires reported.

"To the electrical storms are easily attributed most of our present-day fires, as traveler and citizen alike are daily feeling more responsible for the preservation of the riches bestowed by nature, and although some still hold to the same views as one old timer, who recently made the comment, when lightning fires were being discussed, 'that he guessed that was the Almighty's way of clearing out the forest,' the general trend of opinion seems to be that man, in the form of the Forest Service, is doing an excellent work in keeping a watchful eye on the limits of that hitherto wholesale clearing. A good work and long may it prosper, is the earnest wish of one humble unit, who thanks the men of the Service one and all, for the courtesy and consideration which gave her the happiest summer of her life."

Minnesota has a forested area of 28 million acres, the largest of any State east of the Rocky Mountains.

There are approximately four million acres of timber land in New Hampshire of which about half is in farmers' woodlots.

Forest fires in the United States have caused an average annual loss of 70 human lives and the destruction of 25 million dollars worth of timber.

Juniper from the Indian reservations of New Mexico and Arizona may prove an excellent source of material for lead pencils. Manufacturers are searching the world for pencil woods.

THE PLACE OF A FOREST SUPERVISOR IN THE COMMUNITY

By PAUL G. REDINGTON

Forest Supervisor Sierra National Forest, California

IN the United States there are 150 Supervisors in direct charge of the work on the various National Forsets. These men have administrative jurisdiction over approximately 160,000,000 acres of public property. They are in responsible positions and are chosen because of their fitness to handle successfully the work on their Forests, and their ability to deal fairly with the thousands of people who use the Forests.

Of these 150 Supervisors, 117 (by a very conservative estimate) are located in towns or small cities where they should be known to the large majority of the members of the communities. Laying aside a consideration of their official relations with certain individuals in each community, their potential influence by active participation in movements looking towards "community up-building" is very large.

It is my conviction that every Supervisor has a splendid chance to make his place as an individual just as prominent in his community as his official position is prominent among other occupations of the locality.

The personality of every man in this position, his ability to mix with his fellows, and to take the leadership in community development work, of course will have a great deal to do in fixing his place in his home town. Assuming, however, that the average man is well qualified in these particulars, what ought he to do to make his community the better for his being a member of it?

Education is at the bottom of community progress, just as much as it is the foundation stone of all progressive development. A Supervisor should not hesitate to take an interest in all educational questions, particularly those having to do with the betterment of the grammar and high schools in his community. He should, when asked to do so by the voters, accept a position on the local school board. He should attend public school exercises and be willing to give talks to students, whenever invited to do so. Incidentally, by getting into the school activities in any of these ways he is helping out his profession.

A Supervisor should be willing to go before the county officials to aid school work and development, if he thinks his influence can assist. Western counties are going farther each year in the placing of branch libraries in the mountain towns and settlements, and a Supervisor can find in this an additional channel through which to direct his unofficial activities.

A Supervisor should not fail to take a positive stand which will align him on the right side of all things which have to do with raising the moral tone of the community and he should not be backward about expressing an opinion if he thinks good can be accomplished. Without going into the pros and cons of the liquor question, it is my belief that every Supervisor who lives in a small isolated place where adequate regulation of saloons is not possible, should actively advocate their absolute abolishment in order to keep out lawlessness and in this way help in giving boys and young men the right start in life.

The benefit of church influence in any community is beyond question. Whether a Supervisor is a religious man or not, I think he ought to appreciate the benefit accruing from the location of a church in his home town, and if one is lacking, he should, on general principles, give his aid, financial and otherwise, towards its establishment.

Oftentimes, due to the comparatively small number of residents in a town where a Supervisor is located, and to the consequent uncertain practice, there is no physician. A competent medical practitioner is one of the most needed

MAIL CARRIER APPROACHING TETON PASS FROM THE EAST WITH ONE PASSENGER, MAIL AND EXPRESS.

Notice open slope where slides come and endanger the life of mail carriers and passengers. Lincoln County, Snake River, Teton National Forest, Wyoming. Forest Supervisors equipped with their horses and sled for Forest Service work are of much aid to citizens in this kind of country, especially in winter.

adjuncts of any community, large or small, and a Supervisor should identify himself with any movement which will bring a physician to his community, if one is lacking. This may be done best perhaps by offering a guaranteed salary; each member of the community agreeing to pay a certain amount of the salary at stated periods. Closely allied to this, are the questions of proper sanitation and water supply of towns, and in these I think every Supervisor should take an active interest.

Other community problems, such as the beautifying of streets, the placing of shade trees, the cleaning up of debris, the extinction of insect and rodent pests, are all locally important, and a Forest Supervisor is just as well qualified to take an important part in the proper solution of these problems as any other citizen.

I can see no objection to a Supervisor serving, without pay, as a member of his town council or board of alderman, if by doing so he can help out the community. There may be official objection to this, but if it exists, I do not know of it. Where a community is very small and no town council or similar body exists, a great deal of community work can be done through

THIS SHOWS THE DIFFICULTIES OF TRAVEL BY FOREST OFFICERS OR ANYONE MAKING A WINTER TRIP TO JACKSON, SNAKE RIVER, TETON NATIONAL FOREST, WYOMING.
The horse is down as a result of soft roads.

improvement leagues, and there is every reason, in such cases, for a Supervisor to take an active interest in the organization of such bodies. Through the medium of such, a great deal can be done to elevate the social atmosphere of the community by arranging for simple entertainments, dances, moving picture shows, etc.

A Supervisor should be posted on such topics as life, fire and accident insurance, and should not be backward in urging his neighbors to protect themselves and their property through this medium. He should take an interest in farm credits, particularly if he is in a community where agriculture is an important industry. Oftentimes, associations of individuals can secure better prices on the necessities of life than any individual working alone could, and a Supervisor may in many places have a chance to help in the formation and successful operation of a cooperative buyer's association. In the development of the rual free delivery and the introduction or extension of means of communication, a Forest Supervisor should actively participate.

Good roads constitute perhaps the most tanglible asset a locality can possess, and every Supervisor should know what a good road is, and should work with his neighbors to secure funds from the counties and states, wherever new roads are needed or the improvement of old roads is essential. Officially, a Supervisor in these days must know something about roads, since 10 per cent of the annual receipts from the National Forests is now devoted to cooperative road and bridge projects in the counties in which the Forests are located. With this knowledge the Supervisor should be particularly qualified to take the lead in this line of community activity.

I have touched on a few things which have occurred to me, mainly because I have been fortunate enough to rub up against some of them. Undoubtedly every Supervisor has had the same experience. In fact, I will go farther and say that probably every permanent Forest officer—and there are over 2,000 of them—has had the chance to take a concrete interest in many of the lines of community development work, concerning which I have spoken, and my suggestions therefore can be taken as applying to them, as well as to merely the Supervisory force.

We all know that there is a strong tendency all over the country to improve the conditions of country life, and I sincerely believe that we ought to do our share

BUSINESS MANAGEMENT OF WOODLOTS

FOR THE INSTRUCTION OF OWNERS OF FARMS AND COUNTRY ESTATES

By R. ROSENBLUTH

Director of Forest Investigations, New York Conservation Commmission

THE ordinary woodlot owner has only a very indefinite idea of what his woodlot is worth, or how best to market the product. In cases where he sells the cordwood only, he may know about what it is worth as cordwood, but rarely does he figure whether he could not greatly increase his revenue by selling each tree to the best advantage. Thus, for instance, strange as it may seem, I know of some farmers who are still cutting black cherry for railroad ties—and this in a district near large furniture factories.

In selling a lot of mature timber, the general practice is to sell "by the lot," receiving a stipulated sum for all the wood on the tract. This arrangement is one which practically always works out to the benefit of the buyer rather than to the owner of the woodlot, as buyers generally figure on at least a 25 per cent margin.

Not only is this true of the value of the material cut, but the owner's greatest loss lies rather in the fact that no provision can be made to save any desirable trees for a second crop. The buyer paying a fixed sum for everything in the lot, will "skin" every stick that will yield any profit, and will take no care of young growth which he cannot use, so that what is left to the owner of the woodlot is, indeed, a very poor tract of woods.

Many buyers of such timber lots would prefer to buy and pay for only the mature, or at least the larger trees, leaving material for a second cut within a few years; but when they buy by the lot, they naturally continue the old skinning method.

BETTER METHODS OF SELLING.

It is thus seen that the owners of woodlots should at least abandon the outright sale of all the wood "by the lot," and sell by the unit—so much per thousand feet of lumber; so much per pole, etc.; based on the quantity actually cut, or estimated to be standing on the tract, and should stipulate that great care be used to prevent undue injury to young growth (with a fine attached for trees carelessly broken), and that trees below certain diameters be left, as well as a few selected individuals of trees above those diameters, which may be marked.

The best results will be obtained by having the work done directly by the owner. Where this is impossible, it should be done under his supervision, or with frequent inspection by a trustworthy representative.

Contract work in the woods should be guarded by carefully drawn provisions regarding all the important features of the work. These should be put in the form of a written contract, signed by both parties.

In a complete detailed contract, provisions should be included, in detail under the headings of timber to be cut; provisions against waste; protection against damage; location of camps and mill site, etc.; measurements; payments; faithful performance; disputes; duration of contract.

ESTIMATING THE STAND OF TIMBER.

In cases where the product sold is based on the actual amount cut, it is not necessary to know the amount standing before the cutting is done, in order to make a fair contract for payment. However, in management it is very desirable to know just how much of each kind and size of trees is standing in the woods, in order to base calculations as to the amount which may be cut at any time, and still leave a definite amount for future cuts; to place intelli-

SHOWING A RHODE ISLAND WOODLOT CUT OVER AND THE CORD WOOD NEATLY STACKED AND READY FOR TRANSPORTATION.

SCENE AT A PORTABLE SAWMILL USED IN NEW YORK STATE THROUGHOUT THE WINTER. NOTE SIMPLICITY OF ITS ARRANGEMENT.

gently a value upon the woodlot; and to know how and where best to market the product and to make contracts for cutting.

Various methods of estimating the stand of timber are in vogue. It must be remembered that to make an accurate estimate requires skill and experience, and if the woodlot is of valuable material and good size, it will pay best to hire a forester to make the estimate. He can, at the same time, make a plan for the best method of management. This will save money on such lands.

In the woodlot the area is generally so small that the owner could go through it and count all the trees, and determine just what an average-sized tree would be; find the contents of that average-sized tree; and multiply that by the total number of trees. Or, he could estimate the contents of each tree separately. Unless the woodlot is very small, it would be more practicable to determine the number of trees of each inch class of diameters; find the volume of the average tree of each diameter class, multiply the volume of the average tree of each diameter class by the number of trees in that class, and add together the volumes obtained for each class and thus secure the total volume on the whole area.

In estimating by diameter classes, it is generally the custom to take the diameter of trees at breast height, or four and one-half feet from the ground, in order to be above the root swellings, which vary with individual trees. In measuring diameters an average diameter is taken. Where all the trees are counted, it is best to mark them in some way as they are counted, in order to avoid counting any of them more than once. Plain chalk can be used.

A very useful instrument for measuring the diameters is a pair of calipers, constructed so that one beam is fixed at right angles to the end of a graduated stick, while the other slides along the stick. When the movable beam is pressed against the tree, it stands at right angles to the scale; and the diameter in inches, read off on the scale, gives the diameter of the tree.

THE USE OF VOLUME TABLES.

Based on such measurements at breast height, a large number of tables showing the volume of trees of different diameters has been constructed. Where such a table can be found, all that is necessary to complete the estimate, after determining the number of trees of each given diameter class, is to look up in the table for a given species the volumes of trees of the same diameter and average height, and to use the volume there given. Where no volume table exists, it will be necessary to deter-

SHOWING THE METHOD OF MEASURING TIMBER BY THE SHIP METHOD AS DESCRIBED BY R. ROSENBLUTH WITH THE SUGGESTION THAT IT MAY READILY BE USED ON LARGE SIZED WOODLOTS.

Courtesy Prof. A. S. Bickmore.

SHOWING A WOODLOT RECENTLY CUT AND UPON WHICH STRAIGHT THRIFTY WHITE OAKS HAVE BEEN LEFT BECAUSE THEY WILL YIELD LARGER RETURNS WHEN THEY REACH TIMBER SIZE.

mine the actual contents of at least a few trees in each diameter class. This may be done by selecting trees of as nearly average form as can be found; cutting them down and then working them in such a way as would be done for the market. Then each log, if logs are cut, can be scaled separately, with the ordinary log rule used for scaling logs in that district, and the total board foot contents thus determined. Cordwood, ties or poles may be estimated either by working the tree into those products and determining the actual amount thus obtained; or by determining the solid cubic foot contents, and allowing such converting factors, as for example, ninety cubic feet to one cord of wood. Where the cubic contents are measured, the diameter of each piece is measured at both ends, and the average diameter is taken; the area of a circle of that diameter is found, and that area multiplied by the length of

the piece. The volume of the piece is the result. The sum of the volumes of each piece gives the volume of the tree.

However, in actual practice, it will seldom be practicable or necessary to make such a volume table. It will be easier either to use the volume tables already constructed, or to determine the contents of average trees by actually working them into the finished products, and by measuring the amounts of those products.

The best volume tables give volumes for trees not only of certain diameter classes, but also for different heights of each diameter class, because the volume of trees varies, not only with the difference in diameter, but also largely with the difference in height. That is, a tree of four inches in diameter at breast height, that is twenty feet high, will have a very much lower volume than a tree four inches in diameter and fifty feet high.

It is then necessary in estimating, either to record each tree separately as to diameter and height, or to find the average height of trees in each diameter class. A simple way of determining height is to place a ten-foot pole alongside of the tree, and, stepping off to a convenient distance from the tree, figure the height by eye, comparing the height of the tree with the ten-foot pole.

METHODS IN LARGE WOODLANDS.

Where the area is too large to measure all the trees, or where time does not permit it, various short cuts to an estimate may be used.

One convenient way when the area of the woodlot is known, is to measure off some definite portion, such as one acre or five acres, determine the amount standing on this small area according to the methods described before, and multiply the amount on this area by the figure which shows the proportion between the small area, and the whole. That is, if the small area is five acres, and the whole one hundred acres, multiply the volume on the small area by twenty.

Good judgment must be used in order to select these sample plots that they shall be representative of the whole area. It may be convenient to know that a plot of 208 feet square makes an acre; or that a circular plot with a radius of 85 feet is a half acre.

In still larger areas, where it is difficult to select sample plots which would be fairly representative of the whole stand, it is often convenient to run strips at fixed intervals through the stand. All the timber on these strips is estimated and multiplied by the number of times the strips are contained in the total area. Strips should always be run at right angles to the main slopes; that is, up and down hills, rather than along them. Where very noted changes in the type of forest occur, the amounts in each type on the strips should be estimated separately, and the estimate applied to the area of each type.

It will be seen from this that in using these methods it is necessary to know at least the total area of woodland, and it is much better also to know the area of each type. This involves the mapping of the area.

It is not possible to describe here the way to make such forest maps. Unless the area is very large, or a very accurate map is wanted, a fairly good map may be made by the use of an ordinary hand compass, and by pacing, or else by chaining distances.

In estimating strips, it is most convenient either to take 16½ feet on each side of the line run, or 33 feet on each side. Then, for every chain (66 feet) forward along the strip, in case where 16½ feet on each side of the line has been taken, one-twentieth of an acre has been estimated; where 33 feet on each side of the line, one-tenth of an acre; for every tally of 10 chains (66 feet) in the wider strip, an acre has been estimated; in the smaller, one-half acre.

It is best to tally each acre separately; and where the line ends before a whole acre has been estimated, the number of chains should be noted, and that fraction of an acre used for the strip estimated, rather than continuing on the same sheet back on another line.

Strips sixty-six feet wide, run one-quarter mile apart, will give an estimate

A Dense Border Around the Farm Woodlot Which Prevents the Wind from Blowing Away the Litter and Insures Favorable Forest Conditions.

A Type of a Portable Sawmill Which at Slight Expense May Be Shifted from Place to Place as it is Needed in Cutting a Woodlot.

of 5 per cent of the whole area; one-eighth mile apart, 10 per cent of the whole area, etc.

In sample plots or strip methods of estimating, at least 5 per cent of the total area must be estimated in order to have accuracy in the result; but it will be better to estimate the stand on a greater percentage of the area. Generally an estimate of 20 per cent of the whole area would give a very accurate estimate for the whole stand.

THE MARKETS.

In order to know what a tract of timber is worth, it is necessary to know the value of the products. Not only should the general uses of the different kinds of wood be known, but careful attention should be given to any special use for given kinds or sizes of trees, which may result in increased value.

The market for woodlot timber is chiefly for ties, poles, firewood, posts, piles, rails, lumber, and very frequently in the round for pulpwood, acid factories, and box manufacturers; while special kinds, such as fine white oak, ash, second-growth hickory, cherry, etc., have a large number of special uses, such as in the vehicle industry, furniture making, etc.

It is again urged that owners should be particular to inquire into their special markets, both for the different kinds of timber, and for the most profitable form into which given sized trees may be worked. By taking advantage of this, they can very frequently double the price received for their products.

Lumber is sawed from almost every kind of wood. The principal uses of several kinds are given later, together with the average price of each kind. Prices given show the average price at the mill per thousand board feet of lumber "log run," *i. e.*, the average of all the products sawed from the logs. The average value of the "log run" of lumber cut in most State woodlots is about $25 a thousand feet board measure.

Poles are mostly of chestnut. All poles shall be of sound, live, white chestnut, squared at both ends, reasonably straight, well proportioned, from butt to top, peeled and knots trimmed to the surface of the pole. The dimensions of the poles shall be according to the following table: The "top" meas-

ANOTHER STAND ON WHICH THE MOST DESIRABLE TREES HAVE BEEN LEFT FOR FURTHER GROWTH AND FUTURE CUTTING.

urement being the circumference at the top of the pole. The "butt" circumference being six (6) feet from the butt.

Ties are usually 8 or 8½ feet long. First class ties are 7 inches thick and not less than 7 inches or over 12 inches wide at any place on the face, and must be hewed or sawed on two faces; sometimes allowed to be sawed on four sides, and then to be 7 inches by 9 inches. Second class ties are 6 to 9 inches thick, and with a face not less than 6 inches wide.

It is generally stipulated that not over 25 per cent of second class ties will be accepted on any contract. By far the most common woods used for ties are chestnut and the various oaks. Red oak is discriminated against, either fetching a lower stated price, or ties of first-class dimensions being considered as second-class white oak. The following prices may be taken as a fair average:

First Class Ties: Chestnut, 53 cents; White and other oaks, 65 cents; Red oak, 45 cents;

Second Class Ties: Chestnut, 47 cents; White and other oaks, 53 cents; Red oak, 41 cents.

Cordwood is generally sold by the cord in ranks eight feet long, of wood cut into sticks four feet long, and stacked to a height of four feet. Near towns, however, it is very frequently cut into shorter lengths, such as twelve or eighteen inches, so as to be of stove size; but this generally fetches almost the same price as four-foot pieces, on account of the extra convenience to the user.

Cordwood for firewood is worth about $4 per cord for chestnut and similar woods; $5 for oak, and $6 for hickory. Poplar and spruce cordwood for pulp or excelsior, is worth about $8.50 at the mill.

Charcoal is worth from six to ten cents a bushel.

USES OF PRINCIPAL KINDS OF WOODS, AND PRICES.

The most important general and special uses of our most important woods and average value "log run" for each kind, under average woodlot conditions, is given below and should prove very useful. Average "log run" values are considerably below the value where used for some special purpose. The owner therefore should always look for the very best market for his product; and for that product most in demand and yielding the greatest profit.

White ash is used mostly for agricultural implements, vehicle stock, furniture, basket veneer, and many special uses. Good white ash is especially valuable, and should always secure a special market.

Black ash is rather less valuable than the white ash and is used mostly in veneer stock, for baskets, etc. The average price is about $21.50 per thousand feet of lumber, although it frequently reaches $40 per thousand or more.

Aspen is generally sold by the cord. The average price is about $8.50 per cord at the mill. Its common uses are for excelsior, pulp, boxes, crates, veneer baskets, etc. Popple brings about the same price, and used for the same purposes.

Basswood is generally sold for lumber of the better grades, and special stock is used mostly for vehicles, in furniture, for veneer stock, etc. Its average price is about $21.00 per thousand feet.

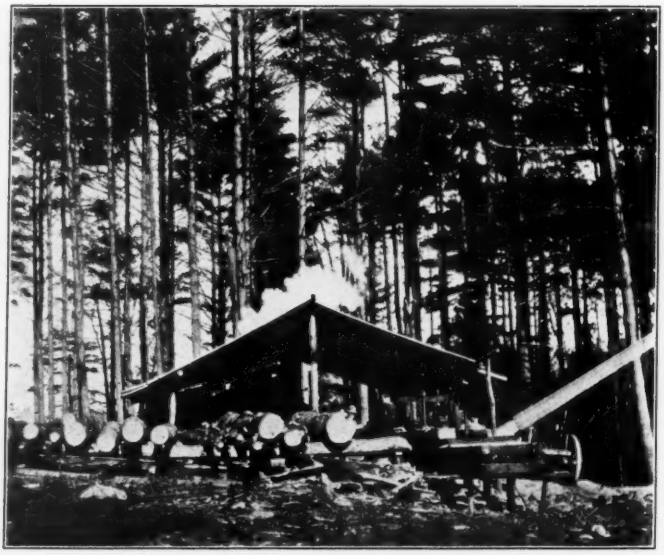
Beech is sold mostly for lumber and cordwood. Its average price is about $14.50 per thousand. Its main use is for agricultural implements, furniture, and novelties, such as clothes pins, wooden blocks, musical instruments, etc.

Birch is sold for lumber or cordwood at an average price of about $20 per thousand feet. Its main uses are for furniture, and veneer stock, and for interior finish. This wood is often stained and used as a substitute for mahogany. Good birch logs should always command a special price.

White birch and paper birch very seldom grow to sizes large enough to warrant use for lumber, and are mostly used for cordwood; and for wooden novelties, such as clothes pins, toothpicks, spools, etc.

Cedar is used mostly in the round for posts and poles. The red cedar

ON THIS TRACT THERE HAS BEEN A CLEAR CUTTING OF TIMBER.
IT WAS A 50-YEAR STAND OF MIXED HARDWOODS—CHETSNUT PREDOMINANT. THE SLASH AND STANDING SMALL TREES ARE BEING CUT FOR CORDWOOD.



ANOTHER VIEW OF A PORTABLE SAWMILL.
NOTE THE SIZE OF THE LOGS.

very seldom grows larger than post size. The white cedar makes poles as well as posts, and shingles and lumber are made from it. Its average price is $24 per thousand feet.

Cherry is mostly used for fancy furniture. Any tree which will yield a good log should be worked into furniture stock, and should always command a special price for this purpose. Its average price is $30 per thousand feet.

Chestnut is used mostly for cordwood, ties, telephone poles and piles, and also very largely for bridge and car construction and furniture, and a large variety of miscellaneous purposes. The average price is about $19 per thousand feet.

Elm is also a wood with a large number of special uses for which it has a special value.

The white elm is the best of the elms. It is used mostly for cooperage stock, vehicle stock, and in such implements as wheelbarrows, etc., where especially strong wood is desired. Its average log run price is now $23 per thousand feet.

Hemlock is sold mostly for ordinary lumber and pulp. It is rather an inferior wood. The average price is $15.75 per thousand feet.

Hickory is used mostly for agricultural implements, tools, vehicle stock, etc. Good hickory is growing scarcer and scarcer and should always command a special price. Frequently trees are worked up into cordwood or other inferior products which should be left to grow lumber. The average price is $25 per thousand; although hickory finds a ready market up to $60 per thousand feet. Hickory cordwood brings about $6 per cord.

Locust is used mostly for posts, ties, insulator pins, etc. The average price is $20 per thousand feet.

Maple is used mostly for furniture and fancy interior finish, wooden novelties, musical instruments, and a very large number of special uses. It saverage price is $18.75 per thousand feet.

Red maple is very inferior to the sugar maple and can only be used in a very limited number of ways as compared to the sugar maple. Special grade maple can always command a special price, especially if it has a

THE OLD STYLE OF FELLING TREES IN WOODLOTS—CHOPPING DOWN A FINE WHITE OAK.

twisted grain, making the famous bird's eye maple.

Oak is used mostly for agricultural implements, vehicle stock, car construction, furniture and interior finish. Its average price is $25 per thousand feet, although good oak can generally find a ready market up to $45 per thousand feet.

The white oak is more valuable than the red oak, but both command the best price when cut into good logs for sawing "quarter sawn" lumber for furniture. Oak is also used to a large extent for ties, posts, etc. Very often trees are worked up into ties and posts which should be left to grow for lumber. Tops and smaller sizes can be cut into cordwood and brings a better price than ordinary cordwood.

The white pine is used for almost every purpose. The smaller sizes and inferior grades find their best uses for boxes, while the better grades and larger sizes are most valuable for furniture, interior finish, and for special uses, such as molds, match stock, etc. The average price is $23.75 per thousand feet.

The red pine is used for much the same purposes as the white pine.

The pitch pine or yellow pine is used mostly for lumber, and is inferior even for that purpose. Near metallurgical works, such as smelters, a special use for this is found in the form of poles used in the reduction process. Pitch pine is often marketed in the smaller sizes for cordwood.

Spruce is used mostly for pulpwood, and larger sizes for ordinary building lumber, and, to a certain extent, for boxes. The average price is about $19 per thousand feet.

Tulip Poplar or yellow Poplar is used mostly for interior finish, cigar boxes, and furniture. It is a high grade wood and generally can command a special price. The average price is about $40 per thousand feet.

LUMBERING COSTS.

The owner, having estimated the amount of wood which he has standing and knowing the value of it in the markets, which he can reach conveniently, now wishes to know what it will cost to get his material from the tree to the market. When he knows that he is in a position to place a value on the standing timber.

In this discussion, we are taking account only of standing timber of merchantable size, which, it must not be forgotten, is much below the real value of the whole woodlot.

The costs of marketing the timber are:

First. Cutting down the trees and working them into logs, poles, ties, cordwood, etc.

Second. Skidding into convenient piles, or to a sawmill, if there be one on the tract.

Third. Hauling logs to a sawmill, if it is not on the tract; or hauling lumber and other products, such as ties, etc., to market, loading on cars, if necessary.

Fourth. Cost of sawing, piling, etc. While the costs of these various factors differ greatly according to circumstances, the following figures are given as fair average costs under general woodlot conditions and will serve as a guide in valuing timber.

COST OF HAULING.

Naturally the most variable cost is that of hauling, on account of the different distances to be hauled; because of difference in the nature of the country and condition of the roads; and through difference in weight between seasoned and greenwood, etc.

A large share of the lumber from woodlots is cut by small portable mills. These can be moved for from $50 to $100, and a stand of 75,000 to 100,000 board feet will warrant a "set up." Therefore, where the haul to any established mill is too long to be profitable, it may pay to have a portable mill come in and saw the logs. Often where there is not enough in one woodlot, two or three owners might combine to have a portable mill set up.

In hauling, an average load for a team along ordinary country roads is about 1,000 board feet of lumber; 32 first class ties, 38 second class ties, six 25-30 foot poles, four 30-35 foot poles, two 35-45 foot poles, or one cord of wood.

Ordinarily a team will average for a day's work, loading, hauling the load 6 to 9 miles, and then returning. The best time to haul is in winter, when sleighing is good.

The cost of a team and driver varies from $4 to $5.50 a day. Generally a team can be hired cheaper in winter than in summer, as in the former season farmers want work for their horses.

In the following figures, it will be assumed that the average cost of hauling is $5 per thousand board feet—that is, that the average load above given, will be hauled; that only one trip per day can be made, and that the wages for the team and driver are $5 per day. This is an average high price for hauling. Generally, it is considerably lower. It is used to be conservative

and rather as an illustration of figuring costs than to be fully representative.

The costs given are those up to loading on cars at the railroad or to delivery to local markets.

Average prices for the other items of cost are given. These can be modified in any given case.

COST OF PRODUCING LUMBER.

The cost of producing lumber may be estimated per thousand board feet as follows:

Cutting	$1.50
Skidding	1.75
Sawing	3.50
Piling	1.00
Hauling	5.00
Or a total of	$12.75

COST OF PRODUCING TIES.

Ties are often hewn at a cost of about 10 cents per tie. Hewing is wasteful, especially in large-sized trees. Ties may be sawed on two or four surfaces.

Generally 33 first-class ties or 38 second-class ties will average about 1,000 board feet of lumber and the average cost will be 35 cents for first-class ties, and 29 3-10 cents for second class ties. Ties are 8 or 8 ½ feet long. First-class ties are 7 inches thick, and not less than 7 inches or over 12 inches wide at any place on the face, and must be hewed or sawed on two faces. They are sometimes allowed to be sawed on four sides, and then to be 7″ x 9″.

COST OF PRODUCING POLES.

Poles are generally peeled and cut to come in one of two classes given in the specifications under products—the most common sizes are seven inches inside the bark at the top.

Poles cut in winter cost a little more to cut than in summer, but are preferred, because they are less likely to rot.

Frequently a cent a foot is charged per pole—that is, a 25-foot pole would cost 25 cents. Poles from 35 to 50 feet long are cut and peeled for 35 cents, while hauling cost may be estimated per load as 83 cents for 25 to 30 foot poles, $1.25 for 35 foot poles; $2.50 for 40 to 50 foot poles; $5.00 for 60 foot poles, only one of the latter being hauled as a load.

COST OF PRODUCING CORDWOOD.

The average cost of cutting and stacking cordwood for burning is about one dollar per cord. Where oak and hickory predominate the cost will be higher.

An ordinary load is about 1 to 1½ cords.

This would make cordwood cost $6 per cord to cut and haul. It would be unprofitable where the haul was six miles or over, for only one cord could be drawn per day, at a cost of $5 for team.

Where the only product available is cordwood, and the distance is too great to haul profitably, the wood may sometimes be burned into charcoal on the tract, and this profitably marketed.

Generally, at least twenty cords of wood should go into an ordinary kiln. Where several kilns are burned at once, the cost of burning is reduced considerably, as one man can watch them all as easily as he can one. It can be produced at a cost of 8 1-3 cents a bushel.

VALUE OF STANDING TIMBER.

Knowing market prices and costs of getting his material to the market, the owner is in a position to place a value on his standing timber. This value of standing timber is called its "Stumpage price." Where he does his own lumbering, the stumpage value might be considered the difference between the cost of marketing the product and the market price. This, however, is hardly a fair value. Each step should be considered separately, and a fair allowance should be made for each.

The lumbering being a manufacturing operation, it is only fair to allow about 20 to 25 per cent net profit on the work; and figure the real stumpage value as the market price, less the cost of lumbering and the profit of lumbering (20 per cent to 25 per cent of the cost). That is, stumpage value is the difference between market value and the sum of the cost of lumbering plus profit of lumbering. Then, if the

owner does his own lumbering, the stumpage value and profit in lumbering will both be his.

On the basis of costs given for marketing the product, stumpage values would be as follows:

Lumber:	Per M. bd. ft.
Average value of lumber "Long Run"	$25.00
Cost of lumbering $12.75 + 25% profit	15.94
Stumpage value	$9.06

Ties:	First class	Second class
Average value	$0.56	$0.50
Cost of lumbering and profit (25%)	0.44	0.36
Stumpage value	$0.12	$0.14

Poles:	25–30 ft. Poles	35 ft. Poles	40–50 ft. Poles	60 ft. Poles
Average Value	$2.50	$4.00	$6.00	$9.00
Cost of logging and profit (25%)	1.35	2.00	3.56	6.69
Stumpage value	$1.15	$2.00	$2.44	$5.31

Cordwood:

Average value $4.00 for chestnut, and similar wood. $5.00 for oak, $6.00 for hickory.

At the rate of hauling, used in these figures, the value of the wood standing, as far as cordwood goes, would be nothing, as it would be a losing proposition to try and market it.

As noted, under such circumstances, it may pay to burn the wood into charcoal on the tract. This gives a lighter and more valuable product to haul.

Average value 34 bushels charcoal (from 1 cord of wood)	$3.40
Cost of logging and profit (25%) on 34 bushels	3.51
Stumpage value 1 cord of wood	$0.10

Under the above theoretical conditions, it will be seen that selling cordwood, the owner would lose $1 a cord, and converting it into charcoal would still be at a net loss of ten cents a cord, allowing 25 per cent profit. However, allowing 20 per cent on the operation, at 10 cents a bushel for charcoal, the owner could come out even, where he would lose money trying to sell as firewood. This sometimes is important in figuring on a pure improvement cutting, or in clearing land after fires, etc. As a general rule, the market for cordwood is closer at hand—mostly at home.

AVERAGE STUMPING VALUE FOR DIFFERENT PRODUCTS.

For convenient reference, taking in consideration ordinary conditions, in woodlots fairly well stocked and in from fair to good condition, the following stumpage value will give an idea of actual value, or of what should be a fair value for stumpage.

Cordwood for firewood, 50 cents to $1 per cord.

Ties, 8 cents to 12 cents per tie.

Poles, $1.25 for 30 ft. pole.

Lumber, $6 to $10 per thousand board feet.

Average stumpage value for woodlands of different sized average trees per acre in well-stocked stands will be about as follows:

Stands averaging	Value per acre.
4 inches diameter	$15.00
6 inches diameter	25.00 to 30.00
8 inches diameter	35.00 to 50.00
10 inches diameter	40.00 to 65.00
12 inches diameter	45.00 to 85.00

To be Continued.

(AMERICAN FORESTRY is indebted for the illustrations used in this article to the New York State Conservation Commission and the Rhode Island Department of Forestry.—*Editor.*)

Canada has established a forest products laboratory in connection with McGill University at Montreal, on the lines of the United States institution of the same sort at the University of Wisconsin.

Tree planting on national forests has to be confined to comparatively short intervals in spring and fall. In spring it starts when the snow melts and stops with the drying out of the ground; in the fall it comes between the fall rains and first snowfall.

New York leads all the other States in the Union in lumber consumption, with a total annual bill for timber of all kinds of over $54,000,000.

AN OLD WOMAN GATHERING REFUSE FROM THE FOREST.
THIS EXEMPLIFIES IN A STRIKING WAY THE EXTENT TO WHICH THE GERMANS CAN PRACTICE INTENSIVE UTILIZATION.

UTILIZATION AT GERMAN SAWMILLS

By NELSON C. BROWN

New York State College of Forestry at Syracuse

TO AN American interested in a more complete utilization of the raw products of our forests, a study of utilization at German sawmills is most interesting. It is said that in Germany, 94 per cent to 96 per cent of the whole tree on the average is utilized, even stumps being grubbed out and used for fuel and tar along with the faggots from the smallest branches, whereas it has been estimated by the U. S. Forest Service that we only use about 40 per cent of the average tree that is felled in the woods.

Of course, the obvious explanation of this discrepancy between American and German utilization is the difference in market conditions—wood is so scarce and consequently prices are so comparatively high in Germany that practically speaking, nothing goes to waste and no wood is too far distant from market to find an attractive price. But aside from this explanantion, we must give the Germans credit for studying their market more carefully and using machines and methods that we will come to use sooner or later. Although observations of their closer utilization may be largely suggestive in their present application to American conditions, yet, we are passing through very much the same economic environment that the older nations of Europe passed through two or three hundred years ago and we can take advantage of and profit by many of their close practices which our conditions will soon make possible.

It has often been an open question in this country as to whether the ultimate mill will be a large or a small one and which will secure the better and more complete utilization. In Germany, the small mill is the rule and there is no evidence that they will increase in size. They would correspond roughly to our mills having a capacity

A Characteristic Sawmill Where a Great Variety of Wood Products are Made and Nothing Is Allowed to go to Waste.
In the foreground, boards from select logs are piled together just as they come from the saw.

of from 30,000 to 60,000 board feet per day and the great majority would have the smaller capacity or less. For example, the largest mill in Bavaria and probably one of the largest in Germany, cuts about 16,000,000 feet a year, which means a daily capacity of about 64,000 board feet when running two hundred and fifty days a year.

Practically every house and building in Germany is largely constructed of stone, brick, or concrete, so that construction and building timbers are not much in demand. The majority of the product therefore goes into interior trim, sash and door stock, flooring, box boards, furniture, cooperage, fencing, railway sleepers, and a great variety of minor lines of utilization. For the majority of these uses, therefore, they demand well sawn stock. Consequently the gang saw is the rule, with a very narrow kerf and the minimum amount of wood going into sawdust.

Wood is very expensive and labor cheap in Germany, so that German machines are built to save lumber and power, whereas American machines are built to save labor. Our machines are built to turn out enormous quantities of product at our sawmills; on the other hand, their machines turn out quality of product. German machines are frequently constructed and fitted to serve a variety of purposes whereas American machinery is intended to turn out one product and to do that quickly. German machinery in turn ordinarily lasts for a long time, whereas ours is not expected to last more than fifteen to twenty years or so.

It is gratifying, however, to see the amount of American machinery in use in Europe. At the above mentioned Bavarian mill, several of the pieces were of American make. In fact, the only band sawmill in the whole Black Forest region and one of the very few in Germany was fitted with machinery made by an American manufacturer. Another interesting fact in connection with these small sawmills is the great variety of products that are usually turned out. Many of these are by-products of the main output and would frequently be sent to the "hog" or burner in this country.

Contrasted to our American condi-

AN ELECTRIC CUT-OFF SAW USED TO CUT LONG LOGS INTO THE DESIRED LENGTHS. IT CAN BE MOVED BY OVERHEAD TROLLEY TO ANY PART OF THE ROLLWAY AND SAVES A LARGE AMOUNT OF UNNECESSARY WASTE IN TRIMMING.

tions, small logs are the rule. This is explained by the fact that under any system of scientific forest management, it does not pay to wait until trees become of large size before they should be cut. The "financial rotation," as it is called, permits of the growth of trees just large enough to be utilized for saw logs and not left long enough in the woods for the compound interest charges to nullify the dividends. This means therefore rather knotty and low grade lumber.

Long timbers or tree lengths are also the rule. On many operations 23 feet (7 meters) is the minimum log length. The advantages explained in connection with this procedure are that the logging and transportation to the mill are more economical, the long logs can be better sawed to the desired length whatever the demands of the market, at the mill, and there is no loss in trimming. Loggers in this country commonly allow from three to six inches for abrasion in transportation and trim at the mill. In many of the German mills, logs are cut to the even desired length and there is no trimming done at all. Long lengths are also barked before shipment. It is said that bark constitutes an average of 10 per cent of the total material in a log. In the case of Norway spruce, beech, and oak, the bark is used for tanning purposes. The bark of other trees is used for fuel.

Another important phase of utilization at German sawmills is the universal practice of sawing closer than is the custom in this country. That is, only an eighth or a sixteenth of an inch is allowed for dressing and stock intended for a variety of uses is never allowed to be sawed one inch in thickness, when three-quarters or five-eighths will suffice. Of course different standards of measurement are used in Germany (metric system) but this is offered as exemplary of the manner in which they study their market and then saw accordingly.

As mentioned before, there are hardly ever any trimmings which in this country go to the "hog" or are sent to the burner. Edgings are used for handles of all kinds, chair rounds, novelty and toy stock, etc., and are seldom used for fuel. The wooden toy industry is very important in Germany

LOGS ARE USUALLY SENT INTO THE MILL ON SMALL TRUCKS RATHER THAN A JACK LADDER.

and toys are exported to America as well as to every European country. The center of this industry is in Nuremburg in northern Bavaria. Slabs are utilized largely for boxboards, veneer cores, short stock, fuel, novelties, etc. Sawdust is sold for fuel and is utilized for making paper and wood alcohol and for general packing purposes. In covering practically every producing region of Germany, the writer failed to see a refuse burner and it is doubtful if there is one in the whole country. Practically all of their ties are sawed, which saves the enormous waste prevalent with our hewn ties. The German railway specifications are also very economical in that in cross section ties need not be rectangular as is the case with American ties. The upper side can be as narrow as five or six inches, as long as the base or lower face is at least ten inches in width. By this means, many logs are made to yield two ties instead of one as with our railroads.

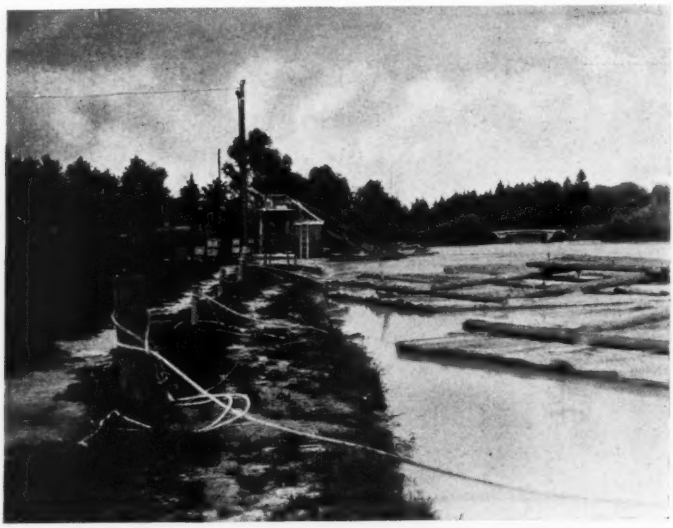
A very interesting feature of their sawmills is that hydro-electric or even steam power supplied with coal is utilized in many cases instead of using sawdust and refuse for fuel. Scarcely a single horse-power in the form of falling water in the mountains is allowed to go to waste with the consequent result that a great economy is introduced. It is said that the first sawmill in Germany was run by direct water power as early as 1322.

In grading, rules formulated and adopted by lumber associations similar to those in this country are prevalent. They are based on dimensions and defects in the same manner as with our own lumber associations. All lumber cut from certain butt logs is piled together for special uses such as matched veneers, furniture stock, and fancy panel stock. In almost every lumber yard it is a common sight to see these boards from the select logs piled one on top of the other just as they occurred in the log. Much better prices are secured in this way for the best grade of logs. Most of the oak from the famous Spessart region is piled in this way and for fancy veneers and cabinet work, especially fine large trees are said to bring from $500 to $1,000 on the stump.

Wood is sold by the cubic unit rather than by the board foot and it is probable that in the future we will adopt the same method. One is somewhat sur-

THESE LOGS ARE DECKED BY ELECTRIC MACHINERY.
THIS METHOD IS USED INSTEAD OF THE AMERICAN LOG STORAGE PONDS TO HOLD THE LOGS BEFORE BEING SENT THROUGH THE MILL.

A LOGGING SCENE IN THE SPRUCE REGION OF SAXONY.
ALL OF THE AVAILABLE MATERIAL IS UTILIZED IN THE FORM OF LOGS, PULPWOOD, BARK, FUEL WOOD OR FAGGOTS.



THE MUNICIPAL LANDING ON THE ISAR RIVER NEAR MUNICH, WHERE THE RAFTS ARE BROKEN UP AND THE LOGS SENT THROUGH THE MILL.
DRIVING IS STILL A COMMON PRACTICE IN THE MOUNTAINOUS REGIONS OF GERMANY.

prised at the amount of lumber seasoned wholly in the open or under sheds. Although considerable is dry kilned not as much is put through this process as one would naturally expect.

Since Germany's forests produce only four principal species namely Scotch pine, beech, Norway spruce, and silver fir with only a little oak, ash, maple, hornbeam, etc., their problem of utilization is much simplified. Many foreign woods, as a result, are introduced to supply the demand and American timbers are highly prized.

At several of the mills visited, many intensive lines of utilization were developed. For instance, at one mill, besides the usual lumber and box board product, there were special machines for turning out broom handles, wooden shoes, implement stock, cooperage, furniture stock, ties and excelsior, and in addition there was a Boucherie timber treating plant to prolong the life of telephone and telegraph poles.

In the United States as a whole four-fifths of the standing timber is privately owned, and one-fifth is owned by various States and the Federal Government. New York owns one fifth of the forest land of the State and one fourth of the standing timber. Owing to a clause in the Constitution this timber cannot be cut even though it is dying or dead and a menace to healthy timber about it. The State should allow careful cutting of mature timber in the Adirondacks.

New York manufactures more pulp paper than any other State, consuming over 1,000,000 *cords of wood per annm. Maine, its nearest competitor, is surpassed by over* 100,000 *cords.*

With over 6,000,000,000 *bd. ft. of timber growing on the forest land owned by the people of the State of New York, over* $20,000,000 *is sent out of the State each year for forest products. Proper use of the mature forests of the State and reforestation of land now idle would keep much of this vast sum in New York.*

FORESTRY ADDRESS TO STUDENTS

Extracts from an Address on Forestry Delivered by invitation before the Faculty and Student Body of Oberlin College, Ohio, January 16, 1914, by Henry Sturgis Drinker, President of Lehigh University and President of the American Forestry Association.

In the opening words of this Address, Dr. Drinker summarized, as he did in his address at Tome Institute published in the October number of AMERICAN FORESTRY, the rise and history of the Forestry and Conservation movement in this country, noting the early work in conservation of the American Institute of Mining Engineers, so long ago as 1871, in the appointment of its Committee "to consider and report on the waste in Coal Mining"—the constant warnings that have come from the engineering professions—the Conference of Governors at Washington, called by President Roosevelt and largely the result of the insistent public preachings on Conservation and Forestry of Gifford Pinchot—the calling in 1909 of the first Conservation Congress at Seattle and finally the splendid forestry record of the last or Fifth Conservation Congress held last autumn.

In regard to the meetings of this Congress, Dr. Drinker said: "The Congress has addressed itself in its several meetings to many important phases of Conservation. Forestry was given much attention in the first two sessions. Then the one at Kansas City in 1911 was largely devoted, as President Wallace expressed it, to the Conservation of the fertility of the soil and the life of the people who live in the open country. The Congress at Indianapolis in 1912 was devoted to the study of the Conservation of vital resources and the health of the people, and finally in this last Congress of 1913 Forestry again came to the front, and the principal subjects of discussion were Forestry and our water power resources—two full sessions of the Congress and a large number of sectional meetings being devoted wholly to forestry; and at these sectional meetings a set of ten exhaustive reports, prepared by Committees arranged for and financed wholly by the American Forestry Association, were presented on the following subjects:

Secondary Forestry Instruction in the United States.
Publicity—Public Education in Forestry.
The Framing, Passing, and Enforcing of a State Forest Law.
Forest Tax Legislation.
Fire Prevention by States, by the Federal Government, and by Private Interests.
The Conditions under which Commercial Planting is Desirable.
Lumbering.
The Closer Utilization of Timber.
The Relation of Forests and Water.
Federal Forest Policy.

"With the above reports by special sub-committees, the General Forestry Committee also submitted a general report giving a synopsis of these sub-committee reports, and also published an exhaustive and able report on 'State Forest Organization with special reference to Fire Protection' by Mr. J. Girvin Peters, Chief of State Cooperation in the U. S. Forest Service. These reports are without doubt the best full summary ever made of the whole forestry situation in our country. The various committees were composed of picked men, experts on the subjects treated, and the reports are obtainable by application to Mr. P. S. Ridsdale, Executive Secretary of the American Forestry Association, 1410 H Street, N. W., Washington, D. C."

Dr. Drinker in his address then touched on the early history of the American Forestry Association and of the Pennsylvania Forestry Association, paying tribute to the services to the cause by Dr. J. T. Rothrock and Mr. John Birkinbine as Secretary and as President of the latter Association, founded so long ago as 1886, and then said:

"These initial movements have now so spread that the Forestry State Organizations and the various Forestry Associations in the United States cover:

33 States having Forestry Departments;
17 States having Conservation Commissions and Similar Organizations;
2 National Conservation Organizations;
2 National Forestry Organizations;
23 National, State, and Local Forestry and Conservation Organizations;
42 Conservation, Timber Protective, and Allied Associations;

And there are now in operation:

23 schools with courses leading to a Degree in Forestry;
11 schools with courses covering one or more years in Forestry;
42 schools with short courses in Forestry.

"This is the machinery now in existence, and rapidly enlarging, for the study and care of our forest interests. Now what in fact do those interests comprise, succinctly stated—

"The forests of the United States at this date (1914) cover 550,000,000 acres, National, State and private, divided as follows:

295,000,000 acres corporations and individuals;
100,000,000 acres farm woodlots;
140,000,000 acres national forests;
10,000,000 acres Indian reservations;
3,246,000 acres state forests;
2,000,000 acres National parks.

"The annual product of the forests amounts to about 20 billion cubic feet, or about 140 billion board feet.

"The lumber industry ranks first in number of wage earners and third in value of products in our country. According to the Census of 1909, the latest actual figures available, the number of wage earners is 734,989. The value of forest products in that year is given as $1,156,129,000. The forest Service approximates the present value as $1,250,000,000.

"The money paid out for salaries and wages was in 1909, $366,167,000, of which $47,428,000 was for salaries and $318,739,000 for wages.

"Surely interests so large are worth caring for. What are we doing to preserve and foster them? It was first said by, I think, Gifford Pinchot, that the two great enemies of forestry, of our woodland growth, are Forest Fires and Unwise Taxation. The country has measurably been awakened to the fire danger. The United States Forest Service notably has done and is doing immensely good and valuable work in this direction and not less then 29 States make annual appropriations for forestry (including fire protection)—ranging in some few States from small amounts up to $164,500 in New York, and $328,000 in Pennsylvania, last year, the total in all the states so appropriating being $1,340,300. The various Forestry and Fire Protective Associations are unceasingly active in fire protection work, led by the example of the Great Western Forestry and Conservation Association which embraces the States of Washington, Idaho, Montana, California, and Oregon, and of which E. T. Allen, of Portland, is the well-known Forester. This Association set the example of printing and distributing among the school children of those States, circulars containing succinct expressive lessons on the fire danger, luridly illustrated, and this example was followed in Pennsylvania in 1912 by the issuance and distribution among the 1,000,000 or more public school and parochial school children of the State, of a Fire Circular prepared and published jointly by the Pennsylvania Forestry Association, the Pennsylvania Conservation Association, the Philadelphia Commercial Museum, and Lehigh University. This circular has been copied and issued in Massachusetts by the Massachusetts Forestry Association and distributed among the 450,000 Public School Children of that State, and also in North Carolina by the North Carolina Forestry Association, and such issue is contemplated in other States, the importance of impressing on school children throughout the country the danger and the useless and great loss resulting from woodland fires being widely felt. A burned building can be comparatively soon rebuilt, but it requires a great many years to grow a forest. When fire runs through the woods practically all the young trees are killed and most of the older ones greatly injured or distroyed, and so also are the live seeds and nuts in and on the ground, all the laurel and berry plants, and the humus or mould soil which holds the stored water from the rainfall, and from which our springs,

creeks, and rivers are kept flowing during the summer and in times of drought.

"So much for Forest Fires—now as to Unwise Taxation:

"Remember that a farmer growing grain may annually harvest and sell his crop, and have wherewith to pay his taxes, but the timber grower raises a crop that does not mature for thirty or forty or fifty years or more, and the taxes should be adjusted so as to bear on the yield when it comes with the cutting of the timber, and not be assessed and made payable annually, or the owner will cut and sell his timber to avoid the annual tax on a crop giving no annual return. Legislation of this nature formulated by Committees of the Pennsylvania Forestry and Conservation Associations was enacted in Pennsylvania in 1913 to encourage reforestation by private owners, and similar action has been taken in New York, Louisiana, and Connecticut, and is in contemplation in other States: Massachusetts and Ohio have recently adopted Constitutional amendments permitting such legislation, and its importance is becoming generally appreciated.

"Whether timber-growing will be undertaken on any large scale by private owners, in this country, even under the most favorable conditions of protection, taxation, and location, is problematical. The work is apparently one mainly for the Federal and State Governments, though much can be done by the private citizen who remembers the Laird's injunction in the 'Heart of Midlothian,' when on his death-bed he enjoined tree-planting on his son, saying,—'Jock, when ye hae naething else to do, ye may be aye sticking in a tree; it will be growing, Jock, when ye're sleeping.' Walter Scott, in a footnote, says of this, 'The Author has been flattered by the assurance that this naive mode of recommending arboriculture (which was actually delivered in these very words by a Highland laird while on his death-bed, to his son), had so much weight with a Scottish earl as to lead to his planting a large tract of country.'

"The National Government under the provisions of Acts of Congress enacted in 1891 and 1896 has set aside large areas for National Forest Reserves in some twenty States, about 140,000,000 acres net area (not counting alienated lands located within the boundaries of the National Reserves); in addition to which there are nearly 27,000,000 acres in Alaska, and about 66,000 acres in Porto Rico, 167,066,000 acres of Government Reserves; if we reckon with this the land located within the boundaries of the National Forests, approximately 21,000,000 acres which have been alienated, we have about 188,000,000 acres in all. These reserves are admirably managed by the United States Forest Service organized in the Department of Agriculture under the charge of Henry S. Graves, United States Forester.

"Fourteen states have set aside areas ranging from 1,950 acres in one state, to 231,350 in Michigan, 400,000 in Wisconsin, 983,529 in Pennsylvania, and 1,644,088 in New York, as State Forests, the total area so set aside in all States being 3,246,832 acres; and these States in their Forestry or Conservation Bureaus are studying and promoting the best utilization of these lands for the public needs. This is supplemented by the work of the Forestry schools and Forestry Associations of the land. A striking instance of this is shown in the study of harvest-bearing trees, made during the past summer by Professor J. Russell Smith of the Wharton School of Finance and Commerce of the University of Pennsylvania.

"If we turn to the Bible for citations in forestry, we find a rather utilitarian view of forestry running through the citations—the interest seemed to center in the preservation only of fruit or nut-bearing trees; for instance in Deuteronomy, Chapter 20, verses 19-20, it is written, (When thou shalt besiege a city a long time, in making war against it to take it, thou shalt not destroy the trees thereof by wielding an axe against them; for thou mayest eat of them, and thou shalt not cut them down, for is the tree of the field man that it should be besieged of thee? Only the trees which thou knowest that they be not trees

for meat, thou shalt destroy and cut them down.) This Scriptural view seems to have been impressed on the Mediterranean littoral lands. Professor Smith's attention was drawn some years ago to the fact that much more attention was being given to the growth in the Mediterranean countries than here of harvest yielding trees, and he went abroad during the past year and made a very valuable study of this subject. As he well says:

"'The immediately important reason for the forestry movement is to prevent an impending wood famine, but the ultimately important call for tree planting is to prevent the wasting of hilly lands and their destruction through erosion. This loss is irreparable. The farmer is accordingly being urged to reforest much of his steep land, which should never have been cleared. The argument in favor of this farm planting can be greatly strengthened if the farmer is urged to plant trees which will yield annual harvests rather than the one final harvest of wood which comes at the end of many years and makes a relatively meagre average annual return.'

"Professor Smith tells us of grafted Chestnut forests on granitic mountain slopes in Corsica which cover large areas as steep as the slopes of the Appalachians, and that this one crop with the attending pasturage beneath the trees serves to keep a fairly dense population in a prosperous condition—that a large proportion of the total pork product of the Iberian Peninsula is due to acorn food. He suggests that, 'The honey locust has a sugary food around a nitrogenous bean with a total analysis much like that of the widely grown carob or St. John's bread of the Mediterranean countries. The carob bean sells for 1c a pound and is a regular crop in extensive territories. While the carob will not grow in America, its age-long success (it fed the prodigal son, the scriptural swine, and St. John, the Baptist), suggests that we can use the allied bean-producing trees, honey locust and mesquite, for crop development in America. This is particularly the case because the mesquite has already become an important crop in Hawaii, where it yields from four to ten tons per acre a year, the bean meal selling for $25 a ton as a substitute for bran. Both of these American beans are greedily devoured by animals wherever they can be found.'

"Professor Smith urges that the example of the Corsica Chestnut forest, the Iberian cork and acorns, the carob, the mulberry and persimmon hog pastures, the Hawaiian mesquite, and other promising nut and fruit bearing trees, seems to indicate the easy possibility of the development of a fruitful forestry rather than a wood forestry, where the conditions are proper, so that we may have a plowless agriculture for steep lands, and he emphasizes the great importance of the development of tree grown forage crops. These suggestions are from letters from Professor Smith to me personally, and are only indications of the fuller information and conclusions which we may hope he will give us soon in published form of his original investigations in this interesting phase of the forestry question."

Dr. Drinker closed his Oberlin address with the warning given in his Tome address, that the public in studying forestry and conservation should not be led aside by sentiment or wrong doctrine, that the main lesson of the conservation of our natural resources is that they shall not be locked up for the needs of future generations to the exclusion of the needs of today and that we should remember, as epitomized by Dr. C. W. Hayes, that conservation is "Utilization with a maximum efficiency and a minimum waste."

Roadside signs, each containing a single catchy sentence in large type, are proving effective in warning against fires on western forests. They give the essentials and tell the importance of protection against forest fires.

A Window Box in Meridan Showing Birds Feeding.
Photo by Ernest Harold Baynes.

STATE FORESTS AS BIRD SANCTUARIES*

By William P. Wharton

IN a recent address by the well-known naturalist, Mr. Ernest Harold Baynes, on Bird Protection, the speaker began his remarks by asking three questions: (1) Do birds need protection by man? (2) Is bird protection by man justified on purely economic grounds? (3) If the answers to these two questions are affirmative, what methods can man employ to the best advantage to protect and increase birds? It requires but a few familiar illustrations from the history of bird life in this country to prove conclusively that nearly all species of birds must have some sort of protection from man if they are to survive. The passenger pigeon, the great auk, the Labrador duck, the Eskimo curlew are extinct chiefly as a result of unrestrained persecution by man, and the heath hen, upland plover, egret and others have been reduced to the danger point by the same cause. Many other species are rapidly diminishing as a direct or indirect result of man's activities. It is

A Young Chickadee at Home, Near Meridan, N. H.
Photo by Ernest Harold Baynes.

needless to inquire further into a question the answer to which is so patent.

The second question—that relating to the economic value of birds—is a more complex one, and the answer to it is not so universal in its application. The investigations of the U. S. Biological Survey, however, indicate strongly that birds as a whole are of the greatest value to the general agricultural interests of the country. An insignificant minority of birds—as for instance the sharp shinned and Cooper's hawks, which prey largely upon useful birds, and certain birds which do extensive damage to farm crops—has been condemned, but the great majority of species have been found, through careful investigation of the contents of their stomachs, to be decidedly beneficial. Although the relation of birds to forests has not been studied quite so carefully in this country as their relation to purely agricultural crops, yet considerable data have been compiled on this subject, and these indicate that birds in the forests are fully as useful as, and perhaps less harmful than, they are in the cultivated fields.

Among the conspicuously useful forest birds in Massachusetts is the familiar chickadee, considerably over one half of whose food consists of moths, caterpillars and other harmful insects and their eggs, including both tent caterpillars, canker worms, codling moths,

gipsy and browntail moths, bark bettles, plant lice, and probably the white pine weevil, which latter does so much damage to young white pine stands in many parts of the State. The woodpeckers also are great forest protectors, 76 per cent of their food consisting of animal matter, largely boring beetles. It is hoped that the spread of the leopard moth, which has destroyed so many of the fine elms in Boston and its vicinity, will be checked in the rural districts by the woodpeckers, which are known to feed on this pest. These birds and some others are working for us in Massachusetts during the entire year. Other forest birds, as for instance the many species of wood warblers, the kinglets, cuckoos, certain flycatchers, thrushes, etc., are in the State only a part of the

ONE SIMPLE TYPE OF FEEDING DEVICE, WHICH COULD BE USED TO GOOD ADVANTAGE IN THE STATE FORESTS.
IT IS A "WEATHERCOCK" FOOD HOUSE WHICH SWINGS WITH THE WIND.
Photo by Ernest Harold Baynes.

year, but during that period they are of vast importance as checks upon the increase of insects injurious to forest trees. Finally certain birds of prey, such as the sparrow, marsh, and red shouldered hawks, and the little screech owl, should not be forgotten; for, by preying on the mice which girdle young trees, and on other rodents, they perform a valuable service to the forester. It is hardly necessary to go further into a subject regarding which there is practically no difference of opinion among investigators. We may therefore assume that bird protection in the forests is justified and desirable on purely economic grounds.

A Nearer View of a Nest Platform Made by Pruning of a Thorn Bush.

Owing to the rather dense foliage the structure of the "whorl" cannot be clearly seen. Estate of Baron Von Berlepsch.

One of the Nest Platforms Formed by the Pruning of a Thornbush.

The shoots are cut back each year, in order that leaves may surround and protect the nest. Estate of Baron Von Berlepsch.

It is interesting to note that German foresters reached this conclusion as regards their forest birds some time ago, and they are now showing us how to answer the third question, as to what measures should be taken to protecf and increase such birds. The city to Frankfurt am Main expends about $400 annually in such work. An area of a hectare, adjacent to one of the forest nurseries, has been especially set aside for bird protective work in an intensive way. Of the 100 specially constructed nesting boxes on this area, 90 per cent are said to be occupied by birds each year. Feeding stations and baths are also maintained, one of the latter being so constructed that the water is prevented from freezing in cold weather by the heat of kerosene lamps beneath it, while blocks of wood and perches are set in the water at varying depths to accommodate different species of birds. Darmstadt has placed some 6,000 nesting boxes in her woods, of which between 80 per cent and 90 per cent are

FLICKER ABOUT TO FEED YOUNG AT ENTRANCE HOLE OF A BERLEPSCH NEST BOX NEAR MERIDEN, N. H.
Photo by Ernest Harold Baynes.

occupied yearly, has established thirty feeding, drinking and bathing stations for birds, and planted two areas with special shrubs adapted to pruning for bird-nesting purposes. In the Heidelberg forests, besides nesting boxes, single shrubs or small groups of species similar to those at Darmstadt are planted in young plantations of forest trees, and so pruned as to form platforms for the nests of birds that nest naturally in shrubs and trees, after the method devised and practiced with such wonderful success by Baron Hans Von Berlepsch on his estate at Seebach, Germany. Here too are about fifty feeding stations. At Baden Baden, also, nesting boxes have been hung in the forest, and plantations established; but here, owing probably to the presence of old trees having natural cavities, probably not over one third of the boxes are occupied. To my questions at these places the foresters' answers were always substantially the same: "We consider birds of great importance in

THE "AUDUBON FOOD HOUSE." COPIED FROM A FOOD HOUSE ORIGINATED BY BARON VON BERLEPSCH.
THIS ONE STANDS IN MERIDEN, N. H.
Photo by Ernest Harold Baynes.

the protection of the forest, and we believe that there is less damage from injurious insects at present than before these bird protective measures were practiced."

Probably the most convincing instance of the value of birds in controlling insect outbreaks in the forest occurred in 1905, in the private forest of Baron Hans Von Berlepsch, who has been mentioned as the originator of the special measures of protection which are being copied in the forests of the valley of the Rhine. Parenthetically it should be stated here that the Baron's system consists in supplying to birds their three chief needs: (1) Favorable nesting sites, of which many of the original natural ones are removed by the intensive practice of agriculture and forestry; (2) Food and water in larger quantities than would naturally be present, especially in winter; (3) Protection from their natural enemies through the killing off of polecats, weasels, stray cats, English sparrows, certain hawks and jays, and some other predatory animals. In his forest the Baron placed several thousand nesting boxes, carefully made in imitation of the nesting holes excavated by the woodpeckers, which latter are commonly used by many of the most useful forest birds. These were placed from 30 to 40 paces apart throughout the broadleaf stands, and at various openings in the dense coniferous stands. The birds, especially the woodpeckers and the tits

THE CASTLE FROM THE PARK. ESTATE OF BARON VON BERLEPSCH.
THE TREES AND SHRUBS ON EITHER SIDE OF THE VISTA ARE FILLED WITH BIRDS NESTS.

THE ANCESTRAL CASTLE FROM THE PARK, ESTATE OF BARON VON BERLEPSCH.
ONE OR MORE PAIR OF MOORHENS NEST ABOUT THE POND AND MANY OTHER BIRDS IN THE TREES AND SHRUBS SURROUNDING. CAVITIES MADE IN THE WALLS OF THE CASTLE ARE OCCUPIED BY BIRDS.

A General View of one of the "Shelterwood" Bird Nesting Plantations of Shrubbery on the Border of a Wood, Estate of Baron Von Berlepsch.

—which latter are similar to our chickadee—soon occupied approximately 90 per cent of these boxes. In 1905 occurred a great outbreak of the destructive moth called Tortrix Viridana. The woods surrounding those of Baron Von Berlepsch were stripped virtually clean, but the Baron's trees, protected by the birds, and by no other known agency, retained their foliage, and stood out amid the surrounding desolation like a green oasis in a desert.

The application of German methods to Massachusetts conditions will not, of course, be all plain sailing, but it may be reasonably assured that the general principles are as applicable here as there, and that the difficulties will come in adapting the German practices to American environment. Probably everyone will agree that the useful non-game birds should receive in our State forests the same complete protection from molestation by man which they now enjoy under the law throughout Massachusetts. The next step, then, should be to protect them so far as practicable from their other enemies, and this object could be accomplished to a large degree by requiring wardens or rangers to kill off certain predatory creatures. Feeding stations and bird baths, established at favorable points in the forest, would undoubtedly attract and hold many birds which might otherwise pass on. The problem of nesting sites is more difficult. Owing in part to the comparative novelty of the artificial nesting box, and in part to the presence of a good many natural nesting cavities in our forests, birds thus far have not taken readily to the former where they have been placed in the woods. Boxes so situated are usually occupied by squirrel or mice, or remain empty, though I am told that flickers and screech owls have been known to nest in them. On the edges of clearings and in old orchards and fields these boxes are now used to a considerable extent, and this is a hopeful sign of what may be expected later in the forests. For as the improvement of the forest proceeds, and dead and decayed trees are eliminated—thus approximating German conditions—the birds will in all probability take more and more to the boxes, and a decrease in their numbers will thus be prevented. Then, becoming habituated to these artificial conditions, and increasing as a result of the protection and encouragement af-

A Row of Poplars Whose Branches Are Cut Back to the Trunks Every Five or Six Years to Form Nesting Sites.
ONE OR TWO NEWTS OF THE YEAR WERE TO BE FOUND IN PRACTICALLY EVERY TREE. ESTATE OF BARON VON BERLEPSCH.

forded them in other ways, there is good reason to hope that ultimately they can be colonized in much larger numbers than are now present under natural conditions—in numbers large enough to control, as they do in Germany, many of the injurious forest insects. For birds nesting in the branches of trees and shrubs, the pruning of certain of these after the German plan, and the planting of hedges and undergrowth in certain places, will, if German results are any criterion, eventually produce a large increase in nesting birds.

The effectiveness of the pruning of underplanted shrubbery on the estate of Baron Von Berlepsch is little short of marvelous. In a double row hedge of thorn (*crataegus oxycantha*) on the edge of a wood, the writer counted thirty-one nests of the year in a distance probably not much exceeding 300 feet, and would probably have found a proportionate number in the larger part still remaining, had the lateness of the hour not prevented. While awaiting the results of his pruning, Baron Von Berlepsch has found that the tying together of the branches of bushes is effective as a temporary expedient. These methods, so far as known to the writer, have not as yet been given a trial in this country.

One phase of this problem has thus far been unmentioned, that relating to the conservation of game birds in State forests. A detailed discussion of this

A Family of Young Bluebirds on Top of the Nest Box in Which They were Hatched Near Meriden, N. H.
Photo by Ernest Harold Baynes.

subject would require much more time and space than can be allotted to an article of this nature. In a general way most people will agree that such a splendid bird as our New England ruffed grouse, or partridge, should by some means be assured perpetuation in goodly numbers in our forests. Without doubt this and other game birds would profit largely by the destruction of predatory animals and other measures for the protection of the other birds. The question then naturally arises, should shooting of game birds be allowed on these forests? It is one perhaps which we are not yet quite ready to decide.

In her large Forest Preserve, New York allows the taking of game under practically the same regulations as elsewhere in the State. Pennsylvania has marked off inviolable sanctuaries in the middle of many of her forests, and the overflow of game from these protected areas is said to be large. At a time when the posting of both public and private lands against shooting by the public is proceeding at a rapid rate, and many sportsmen are complaining bitterly because of that fact, it behooves us to consider the future of the recreation of hunting for the average man. One means of assuring him the opportunity for healthful sport in the future is to make State forests public game preserves. Under game preserving methods, State forest lands could probably be made to produce a large head of game annually, and a certain amount of carefully restricted shooting in them would not decrease the breeding stock from year to year, and would be in no way inconsistent with the complete protection and increase of the non-game birds. Even on the remarkable sanctuary of Baron Von Berlepsch, a certain amount of game shooting is done, without resulting in any progressive decrease in the amount of game. Under any such arrangement, however, it is of the utmost importance that the management of the animal life (as well as the vegetable) be kept in competent hands and out of politics, to the end that the killing of game be regulated in such a way as to insure a plentiful supply at all times, and that the abundance of bird life be the primary consideration.

*From an address at the annual meeting of the Massachusetts Forestry Association.

Receipts from the use of national forest resources were greatest in Arizona last year.

The State of New York has just published a comprehensive report of its wood-using industries.

Of the three Pacific coast states, Oregon and Washington far outstrip California in the work done by private owners for forest protection.

Manufacturers of greenhouses and makers of boxes are getting in touch so that the latter may use for box cleats the cypress waste from the greenhouses.

The development of quicksilver mines promises to make large demands for cordwood and construction timbers on the Tonto national forest, Arizona.

Dr. C. D. Marsh, of the Federal Bureau of Plant Industry, is delivering a series of illustrated lectures to stockmen in the west on the subject of plants poisonous to stock.

The Biltmore Forest School, established in 1898 and therefore the oldest forest school in America, has been discontinued. Dr. C. A. Schenck, its director, has returned to his home in Germany.

Lodgepole pine seed sown broadcast on the snow in southern Idaho last spring germinated when the snow melted, and as many as 60 little trees were counted to the square foot. The summer was so dry, however, that most of the plants died, except where sheltered by brush or logs.

FOREST NOTES

Over 60 acres of land on the College Campus at the Pennsylvania State College have been set aside permanently by the Trustees of the College for the gradual development of a forest arboretum. The tract reserved for this purpose is within two minutes walk of the Forestry Building and lies next to the woodlot of 18 acres which now serves as the "woods laboratory" of the forest school. It is planned to gather together in this arboretum the shrubs and trees that are indigenous to the State of Pennsylvania. No such collection now exists and from a botanical standpoint such a collection will be of great value to botanists everywhere. In addition all trees that can be grown in the climate of Pennsylvania, both native and foreign, will be planted. Such trees as may be of value for making forest plantations will be grown in clumps of a quarter acre each, so that they will grow under forest conditions and develop the form of bole and crown characteristic of forest-grown trees. Each of the trees as well as all others will also be grown as individuals so as to develop the natural beauty and form of these trees when grown in the open, which makes them of value for decorative purposes. Many experiments will be carried on in connection with the arboretum and data taken as to the growth and development of the trees, their value for forest and decorative purposes and their suitability to the climate of Pennsylvania. Planned as the arboretum is on such a wide scale, with the possibility of the tract being greatly extended, should the demand ever come, it is believed that the forest arboretum at State College will in time take its place among the famous tree gardens of the country.

A Division of Forestry has been established in the College of Agriculture at the University of California. Professor Walter Mulford, at present head of the Department of Forestry at Cornell University, has been appointed to take charge of the work at Berkeley.

Mr. M. B. Pratt has been appointed assistant professor in the new Division. At the time of his appointment to the faculty of the University, Mr. Pratt was Deputy Supervisor of the Tahoe National Forest in California. Mr. Pratt is already in Berkeley, and is giving during the present college term a non-professional lecture course on general forestry.

After a careful canvass of 87 of a list of 194 lumber mills in Washington, which Representative Humphreys, of that State, had charged were closed down on account of the new tariff, Secretary of Commerce Redfield has declared that lumber conditions were the same as usual at this season of the year, and that not a single manufacturer or operator could be found who would admit that the tariff has anything to do with the present situation.

Secretary Redfield, in a letter to Mr. Humphreys, quoted from a report made to him by T. M. Robertson and William H. England, special agents of the Department of Commerce, following a visit to the State of Washington.

Some of the acacias, a group of trees with a world-circling range, are so valuable as a source of tannin and timber, says the Department of Agriculture in a bulletin recently issued, that their commercial cultivation in certain portions of the United States may prove extremely profitable. Aside from their value for tannin and lumber, the department goes on to say, they are well adapted to the reclamation of sandy and semi-desert lands, some species being able to thrive with only three inches of rainfall.

All told, there are about 450 species of acacias, 300 of which are Australian species and the rest scattered over the world, principally in Asia, Africa, and America. Australian acacias were introduced into California at about the same time the eucalypts were, and like

the latter have thrived there. Like the eucalypts, too, they are not resistant to frost.

With so many species of acacias there is naturally no form and no rate of growth that is common to the whole group. Some acacias are mere herbaceous plants; some are towering trees; most are shrubs, and some, in fact, are vines or climbers. The largest acacia grows more than 160 feet high, with a trunk clear of branches for 50 or 60 feet and a diameter of from 2 to 4 feet.

That the Federal Government assume jurisdiction over the Glacier National Park is one of the recommendations made by the superintendent of the Glacier National Park, in his annual report to Secretary Lane. Jurisdiction over the park has been ceded by the State of Montana but has never been accepted by the United States, although a bill providing for th acceptance of the jurisdiction has passed the Senate and is now pending in the House of Representatives. "Until such jurisdiction is accepted by Congress," says the Superintendent, "and laws made governing the park reservation, serious and endless confusion and annoyance will be encountered in administering the park rules and regulations."

A large class of students taking work in the forestry department at the Michigan Agricultural College spent their Christmas vacation in the lumbering districts of West Virginia studying the logging and milling operations of hemlock and spruce. The students were accompanied by Prof. F. H. Sanford and Instructor I. W. Gilson.

The headquarters were made in Davis and the operations on the holdings of the Babcock Lumber and Boom Company were studied very intensively. The timber being cut was some fifteen or eighteen miles from the mill and was mostly hemlock with some spruce, the remaining stand being maple, poplar, beech, birch, and a few gums. The company owns many thousand acres and has about six years cut standing. The stands average 25,000 to 30,000 board feet per acre and their mills (hardwood and softwood) handle 30,000 to 100,000 board feet per day respectively.

The students had a train at their disposal and took trips to the woods every day where power skidding, animal skidding, felling, bucking, steam loading, road building, and track laying operations were studied. A full week was spent in the woods on the abovementioned operations and then a trip was made over the whole area with the supply train. This completed the woods work.

The second week was spent in the mills. The work here comprised mill tallying, cost of materials and cost per thousand feet of the different operations, sawyers were checked, mills and the yards were mapped, and the planing, lath, and kindling mill operations were carefully studied. After completing the work the West Virginia Pulp and Paper Mill was visited and a whole day was spent studying the different operations there. The last day was spent in the Independent Tannery and some very interesting data were obtained in regard to the tannin content of different tree barks and nuts.

Other studies were planned but the time allowed was up and the boys packed up and left for Lansing, Michigan, and reached there at the beginning of the second week of school.

Arrangements have just been completed between several Granges and Schools in Rensselaer and Columbia counties, New York, and The New York State College of Forestry at Syracuse University for a number of illustrated lectures upon Forestry. Professor Russell T. Gheen, a graduate of the Department of Forestry of the Pennsylvania State College and now instructor in the College of Forestry, will speak before several granges in New York during March. Professor Gheen will have with him several sets of attractive lantern slides and will talk on such subjects as "The Reforestation of the Idle Lands of New York," "The Forests of New York Past and Present," "The Improvement of the Farm Woodlot" and "The Utilization of Waste Portions of the Farm by the Planting of Forest Trees."

The tenth annual meeting of the Ohio State Forestry Society was held in Columbus, Ohio, recently. A number of interesting addresses were given and all present were enthusiastic and felt they were doing a good work. The officers of last year were reelected: President, Wm. R. Lazenby, Columbus, Vice President, W. J. Green, Wooster; Secretary, J. J. Crumley, Wooster; Treasurer, H. C. Rogers, Mechanicsburg.

Three thousand acres of public timber land valued at nearly $170,000 have been recovered by the Department of the Interior from those who had made fraudulent entries thereon. A long litigation was involved in this suit, which ended in favor of the Government in the Circuit Court of Appeals having jurisdiction of the Lewiston, Idaho, land district. This suit and six others which were won in Idaho, Montana, and Oklahoma restored to the public domain a total of over four thousand acres. This culmination is in line with the announced policy of Secretrry Lane, which is that of no compromise for those charged with public-land frauds.

Other suits brought by the Department of the Interior, in cooperation with the Department of Justice, during the month of December, 1913, were recommended for timber depredations on the public domain in Alabama, Florida and Mississippi, involving damages to the extent of over $5,000.

Two judgments in favor of the Government in timber depredation cases were secured in Arkansas and Idaho. Two suits were recommended to set aside patents fraudeulntly acquired in Mississippi and Washington.

IMPORTANT FORESTRY LEGISLATION IN VIRGINIA

VIRGINIANS are making a determined effort to secure the passage of a bill looking toward the better protection and development of the forest interests of the State and the American Forestry Association is endeavoring to arouse interest throughout the State in the measure. Probably the first State in the Union to begin exploiting the forests and still ranking sixth as a lumber producing State, Virginia has never given any special care to the conservation and improvement of her forest resources. The best available information shows that fifteen million acres, or half of the State, are in forest, and no other State has more magnificent forests, yet few States have done less to preserve this great resource, that stands next to agriculture in value of products and labor, in the State.

The agricultural bill has provided in the past that the Commissioner of Agriculture shall investigate the forest resources of the State and recommend measures for the better development of the forests. Under this act, $10,000 has been spent in the past two years in fighting the chestnut blight, and two bulletins in cooperation with the Forest Service have recently been published on the wood using industries of the State, and on the management of shortleaf pine.

A bill to create the office of State Forester under the direction of the State Geological Commission was recently introduced into the Virginia legislature by Hon. J. G. Blackburn Smith, patron of the bill in the Senate. The bill has received much favorable comment from all parts of the State, from timber owners, lumbermen and allied interests. A public hearing was held in the Hall of the House of Delegates on Wednesday evening, February 25, before a joint session of the Committees on Mining and Agriculture of both houses. The hearing was well attended and much interest was shown. Among those who spoke in favor of

the bill were Senator Smith, T. B. Robertson, Delegate from Northampton, Dr. Lambeth of the University of Virginia, J. Girvin Peters, representing the Forest Service, and Samuel B. Detwiler, representing the American Forestry Association.

The bill, as originally introduced, provided for a separate forestry board and an appropriation of $10,000 per year, but the sentiment of the State appears to be against the formation of new commissions. Accordingly a second bill was introduced by Senator Smith, placing the forestry work under the direction of the State Geological Commission (composed of the Governor, the president of the University of Virginia, the president of the Virginia Polytechnic Institute, the president of the Virginia Military Institute and one citizen from the State at large). Until 1916, the bill provides that the expenses incurred in the organization and operation of the forestry department are to be paid out of the budget of the University of Virginia.

The other provisions of the bill are very similar to those in the law now in successful operation in Kentucky. The principal powers conferred on the forestry commission by the bill are as follows:

1. The appointment of a technically trained man as State forester.

2. The commission has the power to purchase lands suitable for forest reserves at a price not exceeding $10 per acre. It may establish a forest nursery and distribute seeds and seedlings to citizens under proper regulations. It also has the power to sell the dead, mature or large growth of trees on the forest reservations, and also the mineral rights.

3. The commission is empowered to carry on investigations in forest management, to take measures to preventt he destruction of forests by fire (including cooperation with U. S. Forest Service and the appointment of forest wardens), and to assist public and private owners in the protection, management and replacement of timber. It is also provided that they shall investigate the streams and navigable rivers to determine methods, means and cost of improving the same, of preventing their pollution, of conserving the water supply, and of developing the power and other features by which the streams and rivers may be made of most value to the State.

4. The State Forester has supervision and direction of all forest interests in the jurisdiction of the State, including charge of forest wardens, enforcement of fire and other laws for the protection of woodlands, carrying on investigations of the forests and waters of the State, and of an educational campaign in the interest of forestry.

The patrons of the bill in the House of Delegates are John M. Steck, W. T. Oliver, N. E. Spessard, F. B. Robertson, J. H. C. Grasty, R. H. Willis and C. J. Duke.

The need in Virginia of an organized forestry department is so apparent and the bill provides for such a very modest start, that it is to be hoped that favorable action will be taken before the close of the legislative session on March 14. That there is much interest in the measure is shown by the fact that the present bill has had a favorable hearing and appears to have the approval of a great variety of interests from all parts of the State. Forestry bills introduced in 1906 and 1908, by Col. Eugene C. Massie, and ably championed by him, could not be brought to a hearing because of lack of interest.

Dr. B. E. Fernow, Dean of the Forest Faculty of the University of Toronto, is President of the Society of Canadian Foresters, a flourishing association of some fifty members, and was also recently elected President of the Society of American Foresters. The statement was inadvertently made in the February issue of AMERICAN FORESTRY *that this latter organization was the only one of professional foresters in the Western hemisphere. Dr. Fernow calls attention to the fact that there are two.*

The North-Eastern Forestry Company has moved its main office from New Haven, Conn., to the company's nursery at Cheshire.

FOREST FIRES CONTROLLED

DURING 1913 the forces on the national forests fought 4,520 fires, or nearly twice as many as started in 1912, the best year the forests have ever had.

Notwithstanding the great increase in the number of fires, Forester Graves considers that the showing made by the Forest Service was quite as favorable as that in the preceding year, because the damage done and the costs of fire fighting were no greater proportionately than in 1912. In both years practically 50 per cent of all fires were detected and extinguished before they burned over a quarter of an acre, and 25 per cent of both years' fires were put out before they covered 10 acres. Of last year's fires, 3,278, or considerably more than the whole number of fires in 1912, were confined to areas of less than 10 acres, and in 1,080 additional fires less than $100 damage was done by each. In only 25 fires did the damage amount to $1,000.

The aggregate loss in timber is estimated at nearly 59 million board feet, valued at about $82,000, and the damage to young growth and forage is estimated at about $110,000, making a total of about $192,000. About 18 per cent of this loss, however, was incurred on private lands within the forests where 16 per cent of the fires had their origin.

One encouraging feature is that the total number of fires set by railroad locomotives was scarcely more than in the preceding year and represented only 12 per cent of all fires, as against nearly 19 per cent in 1912; also the proportion set by sawmills and other engines in the woods was considerably less than in 1912. This indicates very plainly, Mr. Graves says, that the public is awakening to the need of spark arresters and care with engines in the woods.

CAUSES OF INCREASE IN FIRES.

Looking for the reason of the increase in number of fires, the forester finds three main causes:

First of all, the unprecedented electric storms which swept the whole state of California at the end of a long dry season and set, almost simultaneously, about 700 fires. The 804 fires set by lightning in California formed nearly 50 per cent of the 1,628 fires on the national forests of the State from all causes, and were more than half of the 1,571 lightning-set fires in all the 21 states reporting.

In the second place, there were 757 fires which started outside the forests, of which 644 were stopped by the Government's fire fighters before they reached the forest boundaries, as against 424 which started on outside areas in 1912. However, the proportion of such fires to all those which the service battled with was about the same for 1912 and 1913.

The other increased cause of fires was incendiarism, but this increase was confined to three States, Arkansas, California, and Oregon, all others showing a marked decrease. Of the 452 incendiary fires, 128 were in Arkansas, 133 in California and 142 in Oregon, where two brothers were known to have set 72 on one forest alone. These two and other incendiaries were, of course, severely dealt with by the law. On the Arkansas forest, too, it has been assumed that the 351 fires classed under the general heading of "origin unknown" were mainly incendiary. In California the incendiary fires are largely attributable to what is known as the "light-burning theory," which advances the argument that forests should be burned over frequently to prevent the accumulation of débris. The Forest Service considers this a pernicious theory because it scars the standing timber and thus reduces its value; it robs the forest soil of its ability to retain moisture, and effectually prevents the reproduction of the forest, since such fires destroy all tree seedlings before they have a chance to get a good start.

LIGHTNING CAUSED MOST FIRES.

In 1912, lightning caused more fires

than any other agency, followed closely by railroads, campers and incendiaries, in the order given. In 1913, however, the fires caused by lightning outnumbered the next nearest cause by more than three to one, but the order—railroads, campers and incendiaries—remained the same as in 1912. A considerable decrease in the proportion set by railroads and campers indicates, according to forest officers, a growing carefulness on the part of the general public.

Last year, as in 1912, California led all others in number of fires, this lead being natural because California has such a long dry season. It was followed by Arkansas, Arizona and Oregon, in the order named. Kansas, which had only one fire in 1912, escaped without any in 1913. North Dakota repeated its record of 1912 and had no fires on its one small forest. Not a single severe fire occurred during the year in District 4, which includes Utah, Nevada, and southern Idaho, and in which a large proportion of the forests reported no fires at all.

LOSSES ON PRIVATE LANDS.

There was proportionately greater loss on private lands within the forest boundaries than on the public lands. It is pointed out by the forest officers that these lands cover approximately 11 per cent of the total area included within the forest boundaries, yet the area burned over on these private lands was more than 25 per cent of all. The Forest Service expended more than $30,000 in protecting the private lands within the forests and lands adjacent to and outside of the forests. In addition to this cost, services and supplies to the value of more than $17,000 were contributed by cooperators for fire-fighting on these areas.

In the middle of the fire season, that is in July, the Service had high hopes of small fire damage during 1913, and this hope kept up until the middle of September, when the fire season on the national forests ordinarily is about at an end. At that time there was less damage than had ever been recorded, and only 2,260 fires as against 2,470 in 1912, with about 60,000 acres burned as compared with 230,000 in 1912 and 780,000 in 1911. At the end of the month, however, the electric storms in California and one or two outbreaks of incendiarism changed the whole situation.

But even in the face of these difficulties, the firefighting force, with its plans and experience from preceding years, was able to cope with the situation. In California, in particular, it was as if a military leader, represented by the District Forester at San Francisco, was holding, with a comparatively small number of men or a mere skirmish force, a line of defense extending 750 miles in a north and south direction. This force received, as if from an attack by the heavy artillery of an opposing army, the electric storms, generally unaccompanied by rain, which played havoc all along the Sierras and the Coast Range. That the California force was able to cope with the situation was, according to Mr. Graves, an evidence of the efficiency of the men and the organization.

The paper used by the government printing office each year requires approximately 125 million pounds of rag pulp and 490 million pounds of wood pulp.

F. A. Elliott, state forester of Oregon, says that cooperative fire patrol associations among lumbermen for prevention of forest fires have proved their worth.

Of 606 fires last year on the national forests of Arizona, New Mexico, and Oklahoma, more than one-half were caused by lightning. Campers set about one-tenth, and railroads one-twentieth.

Incense cedar is proving valuable for piling on the Pacific coast where marine borers are particularly troublesome.

NEED OF A FOREST LAW IN SOUTH CAROLINA

REPRESENTATIVES of the American Forestry Association, the Forest Service and the Southern Commercial Congress appeared recently before a committee of the South Carolina Legislature and urged the passage of a State forestry bill quite similar to the bill passed some time ago in Kentucky and now in successful operation there.

There is such a decided need for a forestry law in the State that the legislators are getting urgent demands from every county to give the proposed bill their earnest consideration. There is doubt, however, owing to the quickly approaching close of the session, as to whether the bill will get out of the hands of the committee. Its introduction has aroused so much interest, however, that if the bill does not pass at the present session it is almost certain to do so at the next session for by that time the American Forestry Association and other interests will have so impressed the people of the State with the need of a forestry law that the legislature will doubtless treat it as one of the most important measures before it.

J. Girvin Peters, chief of the office of State Cooperation in the Forest Service, outlined lucidly to the committee the situation in the State. He said:

"It is a wise policy and sound business for South Carolina to protect its forests, and in doing so it may secure the aid of the Federal Government. The value of these forests to the owners, to the wage earner and to the State is enormous.

"Lumbering is the second most important industry in South Carolina. The value of its products is not less than $15,000,000 annually. Of this sum, about $3,000,000 represents the value of the timber before it is cut. The remainder, approximately $12,000,000, is the cost of manufacture, which goes principally in wages to the community. This industry employs over 15,000 wage earners, many of whom are skilled laborers.

"South Carolina has unique possibilities as a timber-producing State. Few other regions in the world are as favorable to tree growth as the one in which it lies. Climate and soil combine to produce the most valuable timber in the shortest time, provided fire and unwise cutting are kept in check. Nowhere else are there so many hardwood species, while its coniferous forests are among the most valuable in the United States. So great is the region's adaptability to forest growth that even worn-out farmland, no longer capable of supporting crops, will in time reclothe itself with trees, if only these can escape the ravages of fire.

"Fire is the forest's greatest enemy. Since the first settlement of this country it has destroyed as much timber as lumbering has utilized. Nor does it confine its damage to the forest growth —the old trees of the present stand and the young ones which should furnish us our forests in the future. It robs the soil of its fertility; it sweeps away the cover provided by Nature for the watersheds, increasing the danger both of floods and of low water in the streams; it impairs these streams' navigability; and it destroys property and interrupts business. A conservative estimate of the area burned over in South Carolina every year would be 400,000 acres, with a loss of nearly $300,000. To this loss must be added that resulting from floods and low water, the extent of which is only too well known to every citizen of the State.

"When fire destroys the young growth in the forest it takes away from the State an important source of future wealth, just as in the destruction of the older trees it removes a present source. Upon the young growth depends the permanency of the lumber industry in South Carolina. If it is left to burn there will be no forest in the years to come to supply the needs of the many wood-using industries. Cut-over lands will remain valueless if the young reproduction which springs up after lumbering is not allowed to grow. Its protec-

tion, on the other hand, will mean that when the present crop of merchantable timber is removed there will be another to take its place.

"As a result of forest fires and consequent deterioration of the soil and elimination of the more valuable tree species, South Carolina today contains vast areas of unproductive waste land, or else land on which such valuable trees as white oak and yellow poplar have been supplanted by the black oaks and other inferior species.

"The blight of fire on the watersheds, which bares the slopes so that there is no impediment to run-off, is invariably reflected in the greater likelihood of floods and of low water. Very few States have as much at stake in the maintenance of an equitable streamflow as has South Carolina. Memory of the disastrous floods of 1903 is still fresh in your minds. So important does the Federal Government consider the relation of forest fires to streamflow that Congress enacted the so-called "Weeks Law," which appropriated $200,000 for cooperative work with the various States in protecting forests on the watersheds of navigable streams. It also appropriated $8,000,000 for the purchase of forested lands which are important in maintaining the navigability of water courses, and in purchasing such lands the Government pays a higher price for those which have not been badly burned than for tracts which have undergone the ravages of fire.

"If an example were sought of results which follow excessive destruction of timber and wasteful methods of handling it, it would be hard to find a better one than that presented by the history of the naval stores industry in South Carolina. From a sum reported to be nearly $2,000,000 in 1879, the value of the naval stores products in South Carolina decreased to $400,000 in 1909. The industry declined as the supply of longleaf pine steadily became scarcer. It can be rehabilitated only by protecting the remaining longleaf pine from fire and adopting proper methods of management. Starting in North Carolina, th industry moved to South Carolina, which at one time marked the center of production. With the depletion of the timber resources in these two States, it moved again to Georgia, and is now concentrated in the pineries of Florida. Yet the permanency of the naval stores industry, which means so much to the prosperity of the Southern States and to the country at large, could have been maintained by the exercise of forethought and a little effort, especially on the part of the State.

"France is one of the largest producers of naval stores, and this result has been brought about not through a gift of Nature, but by the efforts of the French people. Something over a million acres of shifting sands have been transformed by the French Forest Service into a flourishing forest region which supplies all the naval stores of that country. In our own country the United States Forest Service is now experimenting on its National Forest in Florida with the maritime pine of France, which resembles our loblolly in rapidity of growth, and yields turpentine equal in quality to that from the fast disappearing longleaf. The experiments promise to go a long way toward solving the problem of reforesting our depleted Southern pineries, and I mention this instance and that of France merely to show that by taking th nece sary measures it may be possible to renew and keep the naval stores industry in the Southern States, where it originated.

"South Carolina has a productive forest area of about 10,000,000 acres. On this area as a whole it is safe to say that the average annual production per acre does not amount to more than 75 board feet of log material. This means that the total annual growth of the forest of the State is something like 750,000,000 board feet of timber. The annual cut, on the other hand, is estimated at one billion board feet, which exceeds the annual growth by 250,000,000 feet. To put the fact in another way, one-third more timber is each year being taken from the forests of South Carolina than is being produced. And this does not take into consideration the large amount of material used for domestic purposes

such as fire wood and fence rails. With this drain continued it can readily be seen that the forest wealth of the State will eventually become exhausted.

"There is no need, however, for this to come about, By the application of forestry with fire protection as the first step, the annual growth could not only be made equal to the present cut, but it could in all probability be doubled, permitting a gradual increase in the cut without injury to the forest.

"An increase in the annual yield of only 10 board feet per acre would give an additional timber growth in South Carolina of 100,000,000 board feet. With a conservative sale value of $15 per thousand when manufactured, this would mean an increased annual income from timber products of $1,500,000 distributed principally among those who furnish the labor and materials for marketing the products. To obtain this increased income the State could well afford to invest an appropriation of $10,000, $20,000, or even $30,000. Sums such as these would, moreover, be very cheap insurance for the protection of standing timber estimated to be 30 billion board feet worth at least $60,000,000 to the owners, and many times that to the people of the State if saved for manufacture.

"In framing forest legislation for South Carolina, one important fact should be kept in mind. Practically all the timber of the State is in the hands of private owners. If forestry is to be practiced in South Carolina, then, it must be by these same owners of forest land. For this reason the State should endeavor to make the practice of forestry by private owners as easy as possible by removing such a serious obstacle as lack of protection from fire. At the same time it should educate the owners of timberland, through actual cooperation with them, to the need of adopting practical forestry on their holdings. This should be South Carolina's chief aim in forestry. It can be accomplished by (1) the organization of a non-partisan forest department, (2) the appointment of a technically trained man as State forester, (3) the establishment of a fire protective system, and (4) an adequate appropriation of funds."

FIRE SEASON CLOSED

WITH the snows which fell early in January, the fire season in the southern Appalachain mountains has practically closed for this winter. The record of fires on the land which the government has acquired for national forests was much better during December than in November. During November forest officers reported 47 fires on or near government land, while in December there were only twelve. Of course, part of this decrease is due to the colder weather.

In all approximately 700,000 acres have been protected from fire during December. The total area burned over will not exceed 300 acres; the foresters consider this, as compared with the acreage under protection, comparatively insignificant, and point out that it forms less than one-twentieth of one per cent of the area under protection.

During January and February, it was not necessary to employ any fire fighters or patrolmen. However, if the snow should disappear and the leaves get dry, patrol will be started again. The spring fire season usually opens about the first of March. From this time until the green vegetation is well established in May, it is necessary to patrol the woods with the greatest care.

The forest service is compiling a new volume table for calculating the board contents of standing western yellow pine trees in the southwest. It is based on actual measurements of 6,000 trees.

LOBLOLLY PINE ADAPTED TO FORESTRY

THAT farmers and other land owners in Delaware, Maryland, and Virginia can put their worn-out or poorly drained land to profitable use by growing loblolly pine, is the statement made by the Department of Agriculture in a recent bulletin. For several generations, says the department, it will probably be better to grow timber on such areas, at little outlay, than to incur the heavy expense of making them fit for crops. At the same time, intensive agriculture can be practiced on the limited areas best adapted to it.

Loblolly pine, the department goes on to say, is easily the leading tree for commercial timber growing on the coastal plain of these three states, because of the ease with which it reproduces itself and forms pure, well-stocked stands, its rapid growth and the wide range of sites on which it will grow, the many uses to which its wood is adapted, the comparative cheapness of logging and milling the timber, and the good prices which its lumber brings.

The best stands of loblolly ought to yield a money return of anywhere between 4.5 and 10 per cent, on a 20-year rotation. On a 40-year rotation the best stands should bring in not less than 6 per cent, and perhaps 8 or 9.

The range of uses for loblolly is wide, and it is sold throughout the eastern and central states and exported to Europe and Central America. In building construction it is used for interior finish, flooring, ceiling, sashes, wainscoting, weather boarding, joists, lath and shingles. It also finds wide use for boxes, slack barrels, cheap furniture, woodenware and toys. In addition, it is used in bridge and trestle work and for freight cars. A good deal of loblolly pine is cut for cross-ties, which are given a preservative treatment. The wood is very easy to treat with chemical preservatives, and the recent development of wood impregnation processes and plants is rapidly increasing its use for many purposes. Few pines exceed it in use for fuel, and immense quantities of cordwood find a sale in cities as far north as Philadelphia. A report of the woods in Maryland in 1909 shows loblolly as exceeding all other woods combined in the manufacture of boxes and crates, and as standing second in cooperage and basket making.

According to the department, loblolly pine can be grown successfully in Kent and Sussex counties, Delaware; throughout eastern and southern Maryland; and in eastern Virginia.

STATE NEWS

New Jersey.

New Jersey is not letting up in her fight on the forest fires. Last year the fires were more in number than they were the year before and the damage done was somewhat greater, but the increase is accounted for by the fact that the spring was unusually dry and windy.

The records seem to prove that the State has a firm grip upon fires started by brush burners since only 7 per cent of the total number were due to that cause—and brush burning in the New Jersey catalogue embraces every form of intentional fire setting except incendiarism.

The season demonstrated again that the railroad hazard is the most serious. It is therefore, announced that from now on every effort will be directed toward the prevention of such fires. The Fire Line Law, under which upwards of 300 miles of fire lines have been constructed by the railroads, having been declared unconstitutional, a new act was prepared which probably would stand the test of the courts, but after considering the whole situation it has been decided to introduce for enactment a brush disposal law and a fire patrol law. If both become effective the Forest Commission will be in a position to require the removal of all unusual hazards by those who are responsible. The brush disposal law will affect development projects (town lot schemes) in the main, since New Jersey's lumber industry is restricted. The patrol act will require any agency, whether railroad or other, to maintain a patrol when in the

judgment of the Forest Commission a dangerous hazard is found. Both these acts are believed to be more workable, because more elastic, than any other similar acts submitted for enactment in this country.

The campaign against violators of the law is pursued with undiminished vigor, and to New Jersey still belongs the credit of proving that a law against firing the forest can be enforced. The statement is made that during the year 1913, 350 violations were established, of which 39 were simply technical offenses, chiefly burning without a permit and starting back fires without the authority of a fire warden. In another form the statement is made that 52 per cent of all the fires started, 678, large and small, were traced to their authors and fixed as violations of the law. Of the 350 violations the railroads were responsible for 255, brush burners for 72, smokers for 8 and miscellaneous agents for 15. The money penalties recovered in these cases amounted to $1,538.67 at the end of the fiscal year, October 31. Since that date further sums have been received on account of 1913 fires sufficient to make the total penalties collected approximately $2,500.

Massachusetts.

The Massachusetts Forestry Association has offered a prize of a mile of street or road planted with shade trees to the town or city in Massachusetts which this spring plants the greatest number of shade trees in its streets in proportion to its population. Such a prize as this is to be based on the number of live trees of the spring planting when a count is made on September 15. At least fifty towns or cities must enter the contest, and already a large number have expressed the desire to do so. The mile of tree planting will require about two hundred trees.

Maine.

Prof. John M. Briscoe of the University of Maine announces that the camp course in forestry which he inaugurated last year will be continued this summer, and that he expects a large number of applicants. The course is for two weeks and many farmers and land owners take it. It gives them sufficient instruction in general forestry to answer for themselves questions about the best ways of reforesting their waste land; managing their woodlots so as to get the best income without destroying their productiveness; estimating their timber as to amount of it in board feet and its sale value, and protecting their woodlands from fire, insect depredations and fungus diseases. The only requirements for the course are that the student shall be over eighteen years of age and in good health.

The University is also introducing lecture courses on forestry in the normal schools of the State and giving special lectures to the Farmers Week and special short courses in the college.

North Carolina.

The North Carolina Forestry Association will hold its Fourth Annual Convention in Asheville on Wednesday and Thursday, April 8th and 9th. Advantage is being taken of the fact that the meeting is being held in the mountains for the first time to arrange trips for the delegates to two of the most interesting types of forests to be found in the State. These are the forest plantations of the Biltmore Estate and the spruce forests on the slopes of Mount Mitchell, the highest peak east of the Rockies. The Appalachian Park Association and the Asheville Board of Trade are lending their hearty cooperation in arranging for the Convention and no effort will be spared to make this one of the most interesting and largely attended meetings ever held in the South.

The first meeting will be held on Wednesday morning in Hotel Langren, when the set program will be taken up. Prominent speakers are being secured for such subjects as State Forest Fire Prevention, Improving the Farm Woodland, Forests and the People, Shaping State Forestry Legislation, Publicity in Forestry, etc.

Wednesday afternoon will be taken up with a carriage drive to the pine plantations of the Biltmore Estate, where forestry has been practiced for a longer time than any other place in the United States. An evening session will be held at the Hotel Langren.

Thursday morning the delegates will be taken over the recently completed logging road of the Perley and Crockett Lumber Company, Black Mountain, into the spruce forests now being logged near Mount Mitchell and just outside of the Appalachian National Forest. A basket lunch will be provided. The return trip will be made in the afternoon in time for the delegates to catch both the east and west bound trains.

Publicity is to be the keynote of this Convention. It is hoped that some definite plan can be arranged to secure the support and, if possible, the pledge of the various candidates for the State Legislature who will be in the field during the coming summer preparatory to the general state election next November. North Carolina is badly in need of up-to-date forestry legislation and it is to be hoped that a General Assembly can be elected which will act favorably upon the bills advocated by the Forestry Association.

Rhode Island.

Jesse B. Mowry, Commissioner of Forestry for Rhode Island, writes: "Down to the middle of the 19th century the farmers got their limited supply of ready cash from the sale of hay, wood, charcoal and potatoes in Providence, and of milk, cheese, and butter to the local mill operatives. Those who had little streams on their farms erected gristmills, sawmills, and small shops for the manufacture of spools and bobbins which found a ready market in the cotton and woolen factories through Rhode Island. These little mills afforded the farmers a chance to work in winter and added to their incomes.

"The disappearance of the virgin timber, the drift of the farmers' boys cityward, and

the shifting of the grain producing industry westward, in the latter half of the last century, caused these mills to fall into innocuous desuetude. Some towns had as many as fifteen up-and-down sawmills, interesting remnants of which may be found today by the hunter who roams along the streams through the woods.

"Along with the State's development there is now springing up a new interest in corn, timber, electric transmission, and water-power—Earth's cleanest, cheapest, and best motive power, the possibilities of which in this State have never yet been even dreamed.

"Many a limpid trout brook which now unobstructed tumbles down 'to join the brimming river' will soon be harnessed to turn water wheels which in recent years have been greatly improved."

Michigan

Approximately one-half million trees were planted by the Public Domain Commission on the Michigan State Forests in 1913. Practically all of these are the native Norway pine raised in the Higgins Lake Forest Nursery, where about 1,500,000 more choice seeedlings and transplants of Norway and White Pine are available for future reforestation projects. About 500,000 trees will be planted on the Higgins, Houghton, and Fife Lake State Forests during the coming spring.

The method of planting, as now practiced in all planting operations on the State Forests, is to prepare the ground by plowing shallow furrows into which the plants are set. Observations seem to indicate that such preparation of the ground decreases the death rate in the first year to a very small figure. The average death rate in the 1913 plantations was three and one-half per cent, the heaviest being but a little over four per cent. Fall planting resulted in a slightly heavier death rate than the spring planting. The average number of plants set per acre was 2,080, and the total average cost per acre, including plowing and cost of plants delivered to the site, was $5.33.

Plans for the coming summer for the better protection of the State Forests against fires include the erection of a number of steel lookout towers. The Houghton Lake, Fife Lake and Lake Superior Forests are all to be equipped with such towers. Telephone lines will connect the towers with each other and with headquarters. Additional ranger stations are to be established on the Houghton Lake and Lake Superior Forests. Further protection will be afforded by the extension of the system of fire lines on each of the State Forests. The systems on the Higgins, Houghton, and Fife Lake Forests, on each of which there is now a considerable mileage of fire lines, will be brought to completion.

Pennsylvania

The Senior Class of the Forestry Department of the Pennsylvania State College, with Professor R. R. Chaffee in charge, left State College on February 2, 1914, on their annual Lumbering Trip.

On their way to Galeton, Pa., the headquarters for the first week, the party visited the Asaph State Nurseries at Asaph, Pa. At Galeton they made many side trips among which were the visits to the basket factory of Guile and Windnagle at Gaines, the Gaffney Chemical Company at Walton, the National Chemical Company at Lyman Run, the Telescope Cot and Novelty Company at Telescope. The boys derived much benefit from the Galeton Stave and Heading Company's works, and the Pennsylvania Wood Company. A study was made of the sawmill of the Central Pennsylvania Lumber Company and the Emporium Lumber Company. At the several camps to which the boys had access on the holdings of the C. P. L. Company, they had a good chance to see both earth and timber slides; also portable slides invented by F. P. Sykes, Woods Superintendent of the Emporium Lumber Company. While in Galeton the Seniors were fortunate in having the opportunity to hear an address by H. P. Welsh, General Superintendent of the C. P. L. Lumber Company, on "the History of Hemlock Logging in Northern Pennsylvania." Mr. W. W. Lowell, Local Superintendent of the Pennsylvania Lumber Company also addressed the boys.

On February 7 the party left Galeton in a special car, "Callao," for Penn Yan, New York, where they visited the basket factories of Guile and Windnagle and of the Yates Lumber Company.

From this point the boys continued to Lake Clear, New York, where they were met by Edward Patnode who is in charge of the nurseries at Lake Clear and the plantations in that vicinity.

Here the morning was spent in a most interesting and instructive visit to these different plantations both at Lake Clear and Saranac. This chance to see the New York State Nurseries gave the boys a large field of opportunity to see just what is accomplished in that special phase of Forestry work. The courtesy extended to them was fully appreciated by all.

In the evening the party returned to Tupper Lake, where they were the guests of the Santa Clara Lumber Company for the following week. Many interesting side trips were taken, and three days of the stay were spent in the camps of the company on Cold River.

During the week spent at Tupper Lake several instructive talks were given to the boys, among which were addresses by James L. Jacobs, General Superintendent of the Santa Clara Lumber Company, John L. Graham, operator, and Charles H. Cooper, representing the Henry Disston Co., and George McA. Gilbert, Vice President of Ryther and Pringle Company, manufacturers of the Barienger Brake which has been successfully used by the Santa Clara Lumber Company.

On February 14 the party returned to State College after a thoroughly successful trip in every way.

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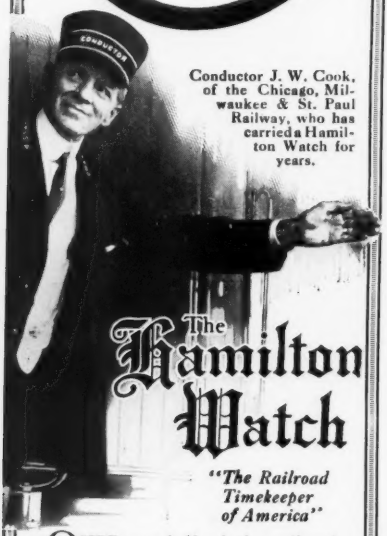

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